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THE RELATIONSHIP BETWEEN INDIA'S GEOGRAPHIC
ELEMENT OF POWER AND ITS MILITARY ELEMENT
OF POWER

A Thesis presented to the faculty of the U.S. Army
Command and General Staff College in partial
fulfillment of the requirements for the
degree

MASTER OF MILITARY ART AND SCIENCE

by

Paida Vijay Reddy, LTC, Indian Army
PSC, Defense Service Staff College, Wellington, 1982
MSC, Madras University, India, 1983.

Fort Leavenworth, Kansas
1991

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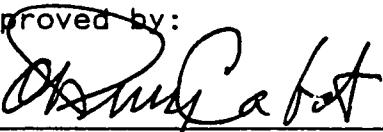
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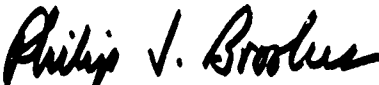
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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

THE RELATIONSHIP BETWEEN INDIA'S GEOGRAPHIC ELEMENT OF POWER AND ITS MILITARY ELEMENT OF POWER: by LTC Paida Vijay Reddy, Indian Army, 123 pages.

The geographic element of a nation is the base upon which all other elements are built. Any analysis of a country's military element, therefore, must be done with a clear understanding of its geographic element.

The author is of the opinion that many analysts have gone wrong in their analysis of India's military element due to a lack of proper understanding of its geographic element.

Using the checklist and descriptive comparison methods, the author has examined India's geographic element to include its physical, economic and human components, thus identifying various imperatives that ought to shape its military element. He then reviews India's military element and matches the imperatives identified, to every relevant facet of its military element.

The study shows that India's military element is indeed influenced largely by its geographic element, especially by the human component of its geography. Its organization, recruitment, training, employment, etc., vindicate the author's findings. There are also certain aspects that do not conform to geographic realities. The author feels that such non-conformity is a result of India's security perceptions and the country's national interests. In sum, the author has produced sufficient evidence to establish a link between India's geographic element and its military element.

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I dedicate this thesis to the Indian Army.

TABLE OF CONTENTS

THESIS APPROVAL PAGE.....	ii
ABSTRACT.....	iii
ACKNOWLEDGEMENTS.....	iv
TABLE OF CONTENTS.....	v
LIST OF MAPS.....	vi
LIST OF TABLES.....	vi
CHAPTER I: INTRODUCTION.....	1
CHAPTER II: REVIEW OF LITERATURE.....	8
CHAPTER III: RESEARCH METHODOLOGY.....	14
CHAPTER IV: SUMMARY OF RESEARCH	
Section 1: Physical and Economic Components of India's Geography.....	18
Section 2: Human Component of India's Geography.....	31
Section 3: Geographical Imperatives for India's Security.....	46
Section 4: India's Military Element As It Exists Today.....	52
Section 5: Relationship Between India's Geographic Element and Its Military Element.....	87
CHAPTER V: CONCLUSIONS AND RECOMMENDATIONS.....	98
APPENDIX A: Definition of Key Terms.....	107
BIBLIOGRAPHY.....	111
INITIAL DISTRIBUTION LIST.....	116

LIST OF MAPS

MAP 1: India - Physical Geography.....	19
MAP 2: Indian Army - Major Units.....	56
MAP 3: Indian Navy - Commands.....	57
MAP 4: Indian Air Force-Commands.....	58
Map 5: 1971 Indo-Pakistan War of 1971 - Eastern Front.....	73

LIST OF TABLES

Table 1: Stock of Technological Manpower.....	37
Table 2: India's Para-Military Forces.....	54-55
Table 3: List of DRDO Laboratories/Establishments In India.....	78-80

CHAPTER I

One general underlying fact must be understood: defense depends upon no one element; it is a combination of many. The first line of defense is the military and naval forces, but geography - physical, human and economic - is the foundation of a nation and its defense strategy.¹

INTRODUCTION

The geographic element of a country forms the base upon which all other elements of power are built. Students of geopolitics contend that the very survival of a nation depends to a great extent on geographical factors - location, size, shape, depth, climate, population, natural resources, industrial capacities and social and political organizations. Naked power has been a vital force in world history and power rests securely upon geographical foundations.²

While considering the various components of a nation's geography, it is important that the effects of each factor (of the geographic component) on a nation's strength be clearly understood. In analyzing the physical component, the first factor to be considered is location. This important factor determines climates, economies and even national policies. The advantages accrue because the

location itself has strategic value or because of its proximity to trade routes, population centres or vital areas. Location is particularly important in the diplomacy and strategy of war.³ The size and shape are the next important factors that merit consideration. Size plays a major role - a large country with adequate arable land, with a large population base, varied climatic conditions and natural resources has vast potential wealth. Conversely, sheer size with vast stretches of wastelands, inadequate population or too much of it, could well be a disadvantage. Shape dictates a country's economic, political and military policies. A compact size fosters unity while compactness without sufficient area can be a disadvantage. Depth is derived from size and shape and has always been important in the defense capabilities of a nation. Topography and surface features are important factors determining offensive or defensive strategies of nations. Climate is yet another important factor that conditions health and energy of man and therefore is a determinant of power. A country endowed with a variety of climatic conditions has a variety of productive capacities.

The economic component of a country's geography comprises its natural resources: soil, energy and mineral wealth. Productive top soil ensures adequate growth of food, without which man cannot survive. Similarly, energy and mineral wealth can support a large industrial base. In

today's age of technology and machines, almost everything we use is made from materials derived from mineral resources. Coal, iron ore, petroleum and uranium are the major requirements of today.⁴

The human component of a nation's geographic element is an important determinant of its power base. Size of the population is singularly important. However, a large population in itself is quite useless. The qualities of the population, such as levels of education, social cohesion, population characteristics, capacity for productive output and culture should be taken into account to determine the net impact that the human component of a nation's geographic element has on various elements of power. In sum, it does seem that the geographic element of a country forms the base upon which all other elements of power are built.

It follows, therefore, that any analysis of a country's military element of power in its entirety, must be done with a clear understanding of its geographic element. Some analysts have gone wrong in their analysis of India's military element due to a lack of proper understanding of its geographic element. As a result, such efforts merely enumerate the total military forces available to India, leading to an inaccurate estimate of India's military power. Stephen Cohen, the eminent American strategist, has noted that estimates of India's military power often suffer from two common errors. The first, usually committed by foreign

observers, is to underestimate the various resources available to India for security purposes while overestimating India's poverty, lack of discipline and diversity. The second, committed by Indian analysts themselves, is to exaggerate the importance of India's size and territorial position while underscoring the difficulty of translating existing material strength into military power.⁵ It is therefore necessary to comprehend India's geographical element of power prior to analyzing its military element of power. The purpose of this study is to examine the extent to which India's geographical element influences its military element.

Definition of Key Terms

Some terms, particularly those peculiar to India, need definition. A list of such terms is shown at Appendix A.

Limitations and Delimitations

While it must be true that the military element should be influenced by the geographic element, it is also interrelated to the nation's political, economic and other elements of power. It would also be influenced by the security perceptions of the nation. This study, however, will not take these other elements or the security aspect into account. The scope of this research is limited to

examining the extent to which India's geographical element influences its military element. The reader would do well to remember this limitation at all times.

Significance of The Study

This thesis will present a systematic analysis of various facets of India's geography, particularly the human component. The effects of population characteristics, social cohesion (or the lack of it), and cultural peculiarities have a profound influence on the nation's military element. This study will enable the reader to understand these aspects of India's geographic element and the extent to which they influence India's military element. By establishing a base for further study and research on subjects relating to India's geographical element, it will be valuable to any military analyst who wishes to examine India's military element of power in its entirety.

Structure of The Thesis

The body of the thesis is in four chapters. In Chapter II, a review of literature is presented. It consists of a brief summary of research material reviewed and sources found to be most helpful. Chapter III presents the methodology followed throughout the study, including the strengths and weaknesses of the approach adopted. Chapter

IV, Summary of Research, is divided into five sections. Section one discusses the physical and economic components of India's geography. Section two discusses the human component of India's geography. Section three summarizes the geographical imperatives in the form of requirements for national security (military element), driven by geographical components. Section four examines India's existing military element and section five evaluates the net influence of India's geography on its military element. Finally, in Chapter V, this author presents his comments and conclusions.

ENDNOTES

1. William W. Jeffries, Geography and National Power, (United States Naval Institute, Annapolis, Maryland, 1962), 12.
2. Ibid, 2.
3. Ibid, 4.
4. Ibid, 8.
5. Stephen P. Cohen and Richard L. Park, India: Emergent Power? (Crane, Russak and Co. Ltd., New York 1978), 16.

CHAPTER - II

REVIEW OF LITERATURE

This author has not found any material that addresses the precise topic of this thesis. The existing literature relating to portions of the topic can be divided into two subjects: first, sources that deal with India's geographical element and the second, material that deals with India's military element. This chapter reviews some literature that was found to be useful to the study and has been divided according to subject, i.e., India's geography and India's military element.

Geography.

The first set of materials reviewed pertained to India's geographical element. The important ones are as follows:

Geography and World Affairs, by Stephen B. Jones and Marion F. Murphy, outlines India's physical geography but is concerned with examining how India's geographical assets are being used for economic purposes. The author would have done well to have discussed the human component of India's

geography as well. This book provides comprehensive facts and figures pertaining to India's physical geography.

Asia's Lands and People, by B. Cressey, contains some useful data on the physical and human components of India's geographical element. Information on distribution of various races throughout India and racial characteristics proved useful to this study. However, with regard to the human aspect, the author has only dealt with races and religions. He has not examined the class and caste composition of Indian society nor has he dealt with India's cultural environment. These omissions limit its overall utility and validity.

Geography and National Power, by William W. Jeffries, was useful in providing an understanding of geographic facts and principles which contribute to a nation's development of its power and policies upon which many aspect of strategy are based. It provided the background knowledge necessary to begin this project.

The Cambridge Encyclopedia of India, Pakistan, Bangladesh and Srilanka, by Francis Robinson, proved to be an excellent source for the research, providing a wealth of knowledge on India's geographical element of power. The author has covered the physical, economic and human components of India's geography in great detail. There are some minor errors concerning habits of the people and some popular myths and beliefs, which only an inhabitant of India

will correctly understand. That notwithstanding, this book proved to be an excellent source for obtaining data on India's energy and mineral resources, population characteristics, climatic conditions, surface features and vegetation.

Some other works like The Nations of The Indian Sub-Continent by Irving Isenberg and India - A Travel Survival Kit by Geoff Crowther also proved to be useful sources of information on India's geographical element of power. However, none of these books establishes a connection between India's geography and its military element.

Three periodicals that enabled this author to gather updated information on India's geography were current issues of National Geographic Magazine, Indo-Nepal Country Profile and Journals of the Asian Profile. These helped fill in gaps regarding information on the physical and human components of India's geography.

Military.

The next set of materials reviewed pertain to India's military element. The important ones are as follows:

The Indian Army, by Stephen P. Cohen, traces the history of the Indian Army from 1600 to 1965. This book contains some useful information pertaining to the recruiting pattern and the 'martial class' theory in the Indian Army. Mr. Cohen has improperly attributed most facets of

the Indian Army to the British. He has neglected to analyze the extent to which India's geographical element has influenced the Indian Army or to note how the army has changed over the years to suit present conditions.

Emerging Powers, by Rodney Jones and Steve Hildreth, was useful insofar as providing information on the order of battle of India's military element and on weapons/equipment held by the Indian armed forces. Unfortunately, the authors do not examine the various other facets of the military such as its state of readiness, employment/deployment philosophies and so on. The book, therefore, does not give the reader a comprehensive picture of India's military element.

India's Defense Strategy and Tactics. By Mahesh K. Singh. The author has tried to draw some relationship between India's geography and defense forces but has not been logical or objective. He has exaggerated the advantages that accrue from India's size and location. The book makes no mention of the problems faced by the country as a result of diverse religions, castes, languages and cultures, that make cohesion difficult. The focus of the book has been to recommend various strategies India could adopt (in the author's opinion) and to tactics that, according to Mr. Singh, could be employed by fighting forces. The book is riddled with grammatical and spelling errors and makes poor reading. However, it does provide

some information on India's existing defense industry which was useful to this study.

Various periodicals and articles proved useful in providing information on India's military element of power. These included current issues of Asian Defense, Armed Forces and Society, Pacific Defence Reporter, U.S. Naval War College Review, Asian Survey, Journals of the United Services Institute of India, journals of the Institute For Defense Studies and Analysis of India, Strategic Survey 1989-90, The Military Balance 1990-91, and current issues of Defense & Foreign Affairs.

Two papers concerning India's military element were extremely useful to this study. The first, Indian Defense Technology Infrastructure and Prospects of Indo-U.S. Cooperation, by K. Santhanam provided useful data on India's defense industry to include research and development capabilities and defense technologies. The second, Strategic Deterrent Option, by Jasjit Singh, provided this author with information on India's missile technology and programs. Both papers have provided data generally not available elsewhere in such detail.

The views of several leading representatives from India's strategic community were sought by this author on matters concerning India's geography and its military element. A wide range of views was received from them,

providing this author with current data that was necessary for the study.

In sum, no source was found that links India's geographical element to its military element. It is felt that this thesis would be a useful source establishing that relationship.

CHAPTER - III

RESEARCH METHODOLOGY

This study uses the checklist and descriptive comparison methods of research. The main purpose has been to determine the extent to which India's geographical element influences its military element. Hence establishing that linkage between the two has been this author's main concern. The basic question therefore is: "To what extent does India's geographical element of power influence its military element of power?"

To answer this basic question, the following steps are adopted:

First, all relevant facets of India's geographical element of power, to include the physical, economic and human components are reviewed. From this review, the various imperatives that ought to influence the shaping of India's military element of power have been identified. Following this, all facets of India's military element to include its configuration, equipment, mobilization philosophy, deployment plans, employment philosophy, training and readiness are examined. Lastly, these two sets of features are matched, leading to an understanding of the degree to

which the geographic imperatives influence the military element.

The research methodology uses the following sequence which required drafting of checklists to guide the detailed study:

The first list identified various components of India's geography and associated questions concerning each. Every question prompted the initial identification of imperatives that ought to influence India's military element.

Next, a list was drawn of the various components of India's military element that warrant analysis. This is necessary to determine whether or not the geographic imperatives are taken into account, and if so to establish the extent to which they influence these various components.

Using these lists as guides to the research paper, this author then proceeded to review the literature available for the study. From then on, the methodology includes a study and descriptive examination of the physical, economical and human components of India's geographical element of power, to answer subordinate questions that lead to the identification of various imperatives.

A study and descriptive examination of India's military element to include its various components, follows. Lastly, a comparison is made of each military component as it exists, to the geographic imperative(s) that ought to be

related to it. This establishes the connection and answers the basic question.

It should be mentioned here, that this author has drawn on his personal observations and experience where necessary evidence is otherwise lacking. In twenty years with the Indian Army, this author has served in a wide variety of locations, capacities and echelons. Observations and judgements that are this author's own, have been noted as such.

Strengths and Weaknesses of Methodology Adopted

Strengths. The methodology used has the following advantages:

Making a checklist directs attention suitably to all facets needing coverage and facilitated a selective review of sources.

The descriptive-comparison method again helped to keep the topic in focus at all times, enabling this author to objectively examine the extent to which the geographical components influence the various components of the military element.

Being an Indian and having had 20 years of experience in the army has been an advantage to this author in reviewing the sources picked for the study. It has enabled him to see clearly where and why some authors, even Indians, have a

narrow view and have gone wrong in their understanding of certain aspects pertaining to India's geography, particularly its human component.

Weaknesses. The methodology adopted suffers from one disadvantage. The descriptive-comparison method calls for very precise identification of the linkage between the geographical imperatives and the various components of the military element. This was not easy. Most material on India's military element takes India's economic and political elements, its interests and the security perceptions into account. Hence prior to applying the comparison method, it has been necessary to separate the 'chaff from the grain' so to speak; in that, this author makes an objective comparison purely from the geographical point of view.

Despite this problem, the methodology adopted has been suitable and effective.

CHAPTER - IV

SUMMARY OF RESEARCH

SECTION ONE: PHYSICAL AND ECONOMIC COMPONENTS OF INDIA'S GEOGRAPHY

Physical Component

India is a large triangular land mass jutting out of mainland Asia. In the north, it is bordered along its entire length by the Himalayan mountains, which are the highest in the world. In the south, the large triangular peninsula is bordered by two great arms of the Indian Ocean - the Arabian Sea in the west and the Bay of Bengal in the east (See Map 1).

India covers an area of 3,287,782 sq km (680,000 sq miles). It measures 3,214 km from the north to south and 2,933 km from east to west. It has a land frontier of 15,200 km. In the north, it is bordered by China, Nepal and Bhutan; in the east by Bangladesh and Burma and in the west, by Pakistan. Just south of India's southern tip lies Srilanka.

Location. The bulk of India's land mass lies between 70 degrees and 90 degrees longitudes and between 8 degrees and

35 degrees north latitude. The country is situated in the middle of the Northern Hemisphere in the north-central point of the Indian Ocean. In a way, it acts as a gateway to trade between West and East. Geographically, the surface regions of India can be divided into seven distinct regions: The Northern (Himalayan) Belt, and Eastern (jungle) region, the central plains, the Deccan plateau, the coastal belt, the western Thar Desert, and the western plains region. In addition to these seven regions, one may also consider the island territories of which India has two - the Lakshadweep Islands in the Arabian Sea and the Andaman-Nicobar Islands in the Bay of Bengal.

MAP 1: INDIA - PHYSICAL GEOGRAPHY¹



The Northern Belt. The Himalayas dominate the entire northern belt. The Indian states in this region include the state of Jammu and Kashmir, portions of Himachal Pradesh, the northern belt of Uttar Pradesh, Sikkim and most of Arunachal Pradesh. The Himalayan ranges are very high mountains with deep, steep valleys. There are 95 peaks in these ranges reaching a height of over 7500 meters.³

Communications are limited in this region hence movement is slow. Large scale movement across the Himalayas is not possible by land. There are a number of passes across the Himalayan ranges. These passes remain open from April to October and are blocked with snow and ice during the rest of the year. None of these passes can sustain prolonged presence and movement. Permanent glaciers exist in the higher reaches of these mountain ranges. Movement in the glacier region is extremely difficult and use of heavy equipment is not possible.

The Eastern Region. The Eastern Region of India includes the states of Assam, Nagaland, Mizoram, Manipur, Tripura, Meghalaya and a portion of Arunachal Pradesh. This region is covered extensively by jungle. The Naga Hills and the Mizo Hills in this region are characterized by narrow gorges and broken terrain. The jungles spread east into Burma. As one goes further south towards Bangladesh, one finds plains crossed by tributaries of the Brahmaputra river which flows

from northeast to southwest in this region. The difficult nature of the terrain also precludes the use of heavy equipment. The defiles, broken ground and jungles are suitable only for small sized operations and for infiltration. Air operations are difficult. Troops operating here need to be trained in jungle warfare.

The Central Plains. Also referred to as the Indo-gangetic plain, this region constitutes the bulk of the land mass of northern India. The origins of this region lie in the Eocene period, some forty million years ago. They were formed by the deposit of alluvium, notably from the Himalayas, as the peninsula was impelled northwards into the 'Laurasian' land mass. The Indian states of Uttar Pradesh, Bihar, Orrisa, West Bengal and portions of Madhya Pradesh make up this region. It is flat, open country with a number of rivers. The terrain is very suitable for normal vehicular movements. The region is often referred to as India's Heartland.

The Deccan Plateau. India, south of the Indo-gangetic plain, is known as the Deccan Plateau. The western slope of the plateau, called the Western Ghats, faces the full force of the summer monsoon as it blows inland from the Arabian Sea. The heart of the plateau is rather dry because it lies in the leeward side of these hills. The eastern slopes of

the plateau are called the Eastern Ghats and are not as rainy as the western slopes. The area is plain and well served with rivers. All central and southern states constitute this region.

The region is suitable for all vehicular movement. It is relatively protected and has depth in that it is far from the northern land frontiers, so forces can be located with relative impunity from the threat of speedy ground attacks. However, there is no protection from air attacks and missile attacks.

The Coastal Belt. India has a 2,759 nautical mile coast line from the Bombay region in the west, all along peninsular India up to the Calcutta region in the east. As a result of this, India has around one million square miles of Exclusive Economic Zone (EEZ).⁴ India has come to realize that the continental shelves of the Indian Ocean are rich in commercially viable placer deposits of a variety of minerals such as titanium, tin, manganese and metal bearing muds (nodes). Energy sources such as uranium, gas and oil are also available in this region. Several sea lines of communication pass through the Indian Ocean, fairly close to India's coastline.

The Western Thar Desert. This region, also called the great Indian Desert, includes portions of the Indian states of

Gujarat and Rajasthan. It is a vast desert with shifting sand dunes, limited road network and limited water sources, all of which are subsoil. A number of these subsoil sources have brackish water unfit for human consumption. This region is suitable for heavy vehicular movement. Communication centers and the limited water sources are necessary to operate in this region. Equipment must be sturdy to withstand the harsh desert climatic conditions. Local inhabitants and animals (camels) will perform better in this region than personnel who are not used to these conditions.

The Western Plains. Also referred to as the plains of Punjab, this region includes positions of the state of Jammu and Kashmir, the entire state of Punjab, most of Harayana and portions of the state of Himachal Pradesh. It is flat, open country, well served by a number of rivers. Except for the rivers, there are no other natural obstacle systems. The area is suitable for heavy vehicular movement. Artificial obstacles, laid in conjunction with rivers, restrict movement. This region offers a corridor for movement between India and Pakistan. Training in river crossing is necessary for units operating in this region, especially to move speedily.

Island Territories. The terrain and climatic conditions here are similar to the coastal region discussed earlier.

The Andaman and Nicobar Islands are about seven hundred nautical miles east of mainland India, and the Lakshadweep Islands in the west are three hundred nautical miles from the Indian coast. They are suitable for naval bases and air strips, making them lucrative targets to an attacker as they are ideal staging areas for an offensive to mainland India. Holding them with forces provides depth and warning time in the event of an offensive against India. Their protection, including control of sea lines of communications to these islands, is therefore important to India. This suggests that India needs a maritime capability for protecting these islands, sea lines of communications and policing its vast coastline.

Climate, Vegetation and Soil

Climate. India's regional climates vary from the very hot deserts of Rajasthan in the west, to the wettest areas on earth, the Assam Plateau, in the east. Despite its tropical latitude, India experiences huge contrasts both of rainfall and temperatures from region to region. The climate in the entire Himalayan region is cold and influenced by altitude. The formation of glaciers in the higher reaches of the Himalayas is an omnipresent feature. Over most of India, January is the coldest month, although much of the central and eastern peninsula enjoys its coldest weather in

December. The north-south temperature gradient is reversed from the host season regime. In the north, the mean minimum temperature is 10°Celsius, while in the extreme south, mean temperature never goes below 20°Celsius.⁵ As for rain, the western coastal region receives up to 4,000 millimeters of rain from May through October. Rain in the interior of India rarely exceeds 800 mm. Assam in the east records some of the highest rainfall in the world, with over 20,000 mm having been recorded in the Shillong Plateau in one year. Generally, however, most of India is subjected to a lengthy dry season. Equipment has to be sturdy enough to perform effectively in the varying conditions of India's climate. Troops must acclimatize to varying conditions.

Vegetation and Soil. The striking fact about vegetation and soils in India are the extent to which they have been modified by man. Despite the fact that forest is the natural cover for the great majority of the subcontinent, there are virtually no stands of natural forests remaining. Over 55% of India's surface area is cultivated. Nevertheless, as much as 78,125 square miles of forest remains in India today.⁶ Indian soils reflect the characteristics of the underlying geology, tectonic and geomorphological history, climate and resulting weathering processes as well as natural vegetation cover and the activities of man and animals.

Vegetation. Tropical deciduous forests form the original vegetation cover over most of India between the Himalayas, the Thar desert and the Western Ghats. Their predominant deciduous nature reflects the lengthy dry season to which all of India is subject. Tropical evergreen forests are found in southern India. Indian vegetation also includes palm and coconut in abundance. Palmyra palms are also found in Southern India and Bihar. Poplars are found in the north in Kashmir and east of Bhutan. Teak and sal are also found in the eastern region. Alpine grasses are common at higher altitudes. Most important are the bamboo regions of the Eastern Himalayas; such bamboo growth is also seen in other parts in India.⁷ Thus the forest regions, with dense triple canopy, afford concealment from air detection. Adequate timber is also available for construction purposes. The jungle region restricts heavy vehicular traffic.

Soils. The largest category of Indian soils are the red soils developed on the ancient Archaean rocks of central India. Mainly light, sandy and often gravelly soils, they are easily worked but do not retain moisture. The southern part of India has the black soils which are clayish but very rich. However, they are difficult to irrigate. Along coastal India, alluvial soils predominate; they also have their widest spread in the Indo-gangetic plain.⁸ The desert region is generally sandy. Most Indian soils are

conducive to agrarian processes. Digging is also relatively easy, making construction of earthworks simple.

Economic Component.

Energy Resources. Coal and lignite provide two-thirds of India's commercial energy output. Gondwana coal accounts for 99% of reserves, estimated at 120,105 million tons, of which 23% are proven, 37% probable and 40% possible. At projected rates of consumption, India's coal reserves are expected to last for over 120 years. Lignite production, 7.8 millions tons in the late 80s, is exploited near Bikaner in Rajasthan. More important are the extensive deposits near Madras. Here, 3,300 million tons of reserves provide the basis for power generation and urea manufacture. An annual output of 6.5 million tons of lignite is planned in order to support a 600 megawatt power station and a urea plant with a capacity of 1.5 million tons per year.⁹

India has been fortunate in discovering huge petroleum reserves which make the country about two-thirds self sufficient in crude oil. Natural gas makes a small contribution to India's energy consumption. Hydroelectricity represents about a third of the total generating capacity, and probably a third of the ultimately feasible hydroelectric potential, estimated at 48,000 megawatts. Of this, 54% is in the Himalayan mountain system which already

contains 40% of the installed capacity. The peninsular river system accounts for 31% of the power potential.¹⁰ Thermal power stations produced two thirds of the power generated in 1984 with nuclear power stations at Tarapur (Bombay), Kotah (Rajasthan), Madras and Narora (Uttar Pradesh) adding just over two percent. India possesses its own uranium ores, in the Singhbhum area of Bihar, and is in the process of expanding its nuclear generating capacity.¹¹ With abundance of coal and nuclear power generation capacities, India is close to self sufficiency in energy needs.¹²

Mineral Resources. India has adequate reserves of a large number of minerals. It is a leading producer of iron ore. From its own ores, it manufactured 11 million tons of ingot steel in 1985 and exported up to 41 million tons in 1980-81.¹³ Chromite, an important source of a ferro-alloy, is found in several parts of India. Among non-ferrous metals, India is self sufficient only in aluminum. Bauxite is mined in coastal regions and expansion in copper ore production promises ultimate self-sufficiency. Beach sands in South India yield ilmenite and rutile, sources of titanium and monazite for thorium. As these are considered strategic minerals for high-tech aircraft etc., relevant statistics are not made public.¹⁴ India also has areas where lead and zinc are mined, with some success. Gold is

mined in southern India near the city of Bangalore. India's non-metallic minerals include mica, an important mineral for the electronic industry, and rock phosphate. Alluvial deposits from ancient rocks of peninsular India have yielded some of the world's most famous diamonds. A belt of sandstone in Madhya Pradesh currently yields industrial diamonds which meet half of India's needs. There is thus an adequate base of energy and mineral resources to support industry (Defense Industry), and strategic minerals are available to be put into nuclear use. Nuclear installations and power generating plants are high opportunity targets and need protection. India's offshore energy facilities, coupled with the fact that most of its trade routes are by sea, further suggests the requirement for maritime policies and programs for protecting its interests.

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SECTION TWO: HUMAN COMPONENT OF INDIA'S GEOGRAPHY

Population - Size, Growth Rate and Distribution. It is estimated that India's population was approximately 830 million in mid-1989.¹ About 40% of the population is below 14 years of age. The population is growing at a rate of 2.1% a year. The male to female ratio for all ages is 107:100.² Population density rose from 178 per sq km in 1971 to 221 in 1981.³ The most densely populated state is Kerala in the south. In spite of speedy urbanization of the population, by the turn of the century, two thirds of India's population will still be rural. Large cities now account for about 40% of India's urban population. There is adequate manpower to support a sizable military force; however, a large percentage would be from rural backgrounds.

Social Structure. Centuries ago, the Indian people began to divide into different groups or classes. At first, they were separate social classes, without the caste code which arose later.⁴ Over the years, four major castes emerged. At the top was the priestly caste comprising teachers, scholars and priests called 'Brahmins'. Next came statemen and soldiers called the 'Kshatriyas'. Then came the merchants and farmers called the 'Vaishyas' and lastly the laborers and workers (serfs) called 'Shudras'. Over the centuries, the four major castes were divided into thousands

of sub-castes. Each sub-caste was decided by its specific occupation like the carpenters, blacksmiths, etc. Within the subcaste, some enjoyed more privileges than the others depending on their level of prosperity. This gave rise to clans within the sub-castes. The result of all this is an incredibly complex social structure governed by a set of rules. It exists even today and is a rigid system. Outside this caste system is another group - the Untouchables. This group's work is sweeping streets, picking up refuse, treating animal hides, disposing of dead animals and so on. Such work has been thought to make them unclean.⁵ The strength of the caste system and prejudice against Untouchables have been declining over the years. Today, it is forbidden by law to make any such discrimination but the fact remains that it is prevalent. Rural ideas and dogmas, coupled with vested interests, have kept this division going.

The 'group' in the present day Indian society remains extremely strong, whether it is clan, sub-caste or caste group. Even abroad, Indians tend to associate with the group with which they identify, rather than with the larger Indian community. Compared to most societies, then, Indian society tends to be lumpy and made up of semi-autonomous groups. Moreover, the pattern of modernization and politicization in India has tended to enforce group solidarity, based on caste and religious community.⁶ Therefore, people generally feel comfortable working with those of

their own group and are ill at ease when interacting with those of other groups. Although there are no written strictures, in reality all interpersonal relationships, official and unofficial, are likely to be influenced by group/caste affiliations.

Population and Social Characteristics. History, and socio-economic conditions, have contributed to certain distinct characteristics being a part of India's population and society. Some important ones are discussed below:

Religion. India is a kaleidoscope of religions. There is probably more diversity of religions and sects in India than anywhere else in the world.⁷ Apart from having nearly all the world's religions represented, India has been the birth-place of two ancient religions - Hinduism and Buddhism. It has been an important home of another old religion of the world, Zoroastrianism, and a home to an ancient religion unique only to India - Jainism.⁸ The other major religions in India are Sikhism, which again originated in medieval India, Christianity and Islam. For a variety of reasons, religious fundamentalism is growing. The Hindu religion comprises 80% of the population while Islam has a 10% following; all other religions grouped together account for the other 10%. Food habits, religious rites and customs vary considerably with each religion. Outside group

solidarity, Indian identification with religion is fairly strong. The minority religions feel insecure and religious antagonism is an omnipresent factor in Indian society. Religious fundamentalism has, in recent years, been so strong that it has even denied justice to weaker sections, notably women.

The predicament of Mrs. Shah Bano, a victim of religious fundamentalism, is a good example that illustrates the extent to which religion influences Indian society. In 1985, Shah Bano, a divorced 73 year old Moslem woman, brought before the Supreme Court of India a petition for maintenance from her former husband. The Supreme Court, in a written judgement by the Chief Justice, ruled in favor of Shah Bano, directing that her former husband must pay her a very small monthly allowance of Rupees 179 (\$10.00) per month. The decision was welcomed by the Government, women's groups and progressive political parties. Some members of the conservative Islamic clergy, however, raised the cry of "Islam in danger" and charged that the government was interfering in religious affairs. For this group, the Supreme Court ruling, which they interpreted as opposed to Islamic law, or the Shariat, was tantamount to interpreting the holy Koran. This function, they argued, must be left to the Islamic clergy. They saw the decision as a danger to their culture and identity.⁹ Highly alarmed, they petitioned Rajiv Gandhi, then the Prime Minister, to somehow

get the decision reversed. Shah Bano, who had merely sought financial survival, was now made aware of the far reaching consequences of the decision in her favor. Under pressure from the clerics and told that her action was un-Islamic, she then withdrew her demand for maintenance and asked the court to reverse its decision. But the court had spoken, upholding the right of all women, regardless of religion or community, to their legitimate rights under the law. The decision could not easily be reversed.

For the clergy, however, the decision had little or nothing to do with justice for Shah Bano and thousands of women in her difficult predicament. The clergy saw the decision as a threat to their control over the community and authority and moved to prevent its implementation. Progressive leaders on the otherhand saw no contradiction between tenets of Islamic Law and the court ruling. They pointed out that in Turkey, Ataturk had abolished the Shariat and established a uniform civil code. Nevertheless, the All-India Muslim Personal Law Board met and demanded legislation, annulling the Supreme Court decision. This, coupled with widespread civil unrest in the country on this issue, forced the Government and Parliament to draw up a new legislative bill annulling the court decision. Rather than liberating women from economic bondage, the new law gives the conservative elements in Indian Muslim society control over women's lives by strengthening economic dependence of

women on the community.¹⁰ Such is the unfortunate influence that religion has on India's society and people.

All organizational structures may have to conform to India's social structure. However, in the interest of national integration, a mixed structure may be useful in the long run. For efficiency and better morale, religious antagonism must be prevented in the armed forces.

Language. From the linguistic viewpoint, India is again a kaleidoscope of a large number of languages and dialects. Hindi is the language of the majority of North Indians but there are many other languages. Indian states are divided on a linguistic basis. English, introduced by the British, is widely spoken and is generally accepted as the working language along with Hindi. However, the rate of literacy being low, in rural areas, people speak their own regional languages. As of now, it would seem difficult to break the language barriers which are so deeply rooted in Indian society. A common language for the military organization will be useful for uniformity and training. However, the organizational structure may need to be flexible to accommodate various linguistic groups.

Literacy. The level of literacy in India is low. Since its independence in 1947, the Indian government has endeavored to eradicate illiteracy. However, in view of its size, large population and limited resources, not much progress has been made. In 1981, the literacy rate of India

was as low as 36.17%. While literacy rates have increased and stands today at about 42%, in absolute terms, the number of illiterates has actually increased.¹¹ Poor schooling facilities and rural nature of the population dictates that conditions are not likely to improve radically in the years ahead. On the other hand, it is significant that a literacy rate of 42% also means that India has close to 250 million people (census includes people of working ages), who are educated. A large number of them have technological backgrounds, enabling India to have the third largest pool of scientists and engineers in the world after the United States and the Soviet Union.¹²

Table 1 below shows the growth of the stock of technological manpower in India over the past 40-odd years. The total reserve of engineers and scientists in 1980 was 1.78 million. The reserve in 1990 has been 3.18 million.¹³

TABLE 1: STOCK OF TECHNOLOGICAL MANPOWER¹⁴

Specialty	Year				
	1950	1960	1970	1980	1990
			(in thousands)		
Science	134.9	312.8	744.7	1231.9	2620.0
Engineering	53.1	137.2	420.8	550.8	1189.2
Total	188.0	450.0	1165.5	1782.7	3809.2

This is a unique resource. This enormous growth rate in a period of 40 years, assures the country of a sizable stock of technological manpower for a long time to come.¹⁵

Indian progress in space technology with its own satellites in space, its missile programs and application of science and technology to various fields is evidence of the effectiveness of this technological manpower. On the other hand, 58% illiteracy means that the majority of the population is uneducated.

The bulk of the manpower pool in the armed forces without artificial adjustment would therefore, have low standards of education. Extensive training is necessary for some jobs/positions in order to ensure functional efficiency. Suitable policies and programs are required to attract technological manpower into the armed forces, hence recruiting policies need to be tailored to meet this requirement.

Cultural Environment. The cultural environment in India is unique. Several aspects that have a bearing on this topic merit examination. To an extent unknown elsewhere, the Hindu life revolves around philosophy and religion; around man's relation to the universe.¹⁶ Systematic introspection has been practiced in India for centuries. Certain attitudes of mind and ethical ideals were peculiar to India; one of them was intellectual tolerance. However, today these values have been eroded to an extent where there seems no trace of tolerance. Religious rivalry and fights are the order of the day. Studies relating to India's cultural environment in rural

areas have shown that tradition and dogma have played a significant role in shaping the Indian rural psyche. There remain traditions in education, agriculture, health practices and other human endeavors which are anchored to the old value system on which the modern processes of growth and technology impinge.¹⁷ It is practically impossible to reconcile the old and the new, the traditional and the modern, in different fields of personal and social life.

Indians themselves often point to the knots of people seen apparently idle throughout the country and say that their countrymen generally tend towards indolence, with utter disregard to time and its flux. An entire village may spend a whole day running curiously after a wounded pigeon, as it hops from tree to tree, with the fond hope of catching it when it falls. This may be what Huizinga in his Decline of the Middle Ages calls the play-element in culture.¹⁸ Participation in such frivolous activities, with utter disregard to engaging themselves in productive ventures, has prevented the Indian society from progressing. People reconcile themselves to their state of affairs by believing that they are destined to live the way they do. As noted in India's social structure, an Indian is attached to his family and group, more than to anything else. This 'family orientation' blinds him from thinking of the nation as a whole. A family is governed by a set of rules and ideally follows the practice of extended families - all members of

the family living in one house or courtyard.¹⁹ The system offers security to the individual as incomes are pooled and food is shared. A son will care for needy parents and the head of the family is accorded the greatest respect.²⁰ However, the system suffers from a lack of privacy, lack of individual growth and development, and breeds lassitude, apathy and a false sense of security.

Indian culture looks upon a woman with respect but feels that her place is at home. A woman without a husband is considered worthless. While this attitude is slowly changing, the fact that a woman in Indian society is considered - and treated - inferior to a man is established beyond doubt. Culturally, Indians value simplicity over material benefits. The concept of simplicity with efficiency has been a feature of many of its traditional devices.²¹

The 'martial race' theory is another phenomenon that has effected the Indian society for many years. This theory was invented by the British for the purposes of recruitment into the British Indian Army in the 1880s. The Indian Army Mutiny in 1857, also called the Sepoy Mutiny, threatened British rule in India. The British came to some important conclusions thereafter. First, it was realized that certain Indian castes that had developed their intellectual capabilities were a threat to the British government. These were the Brahmins and Vaishyas. Second, there was a need to

recruit manpower that would prove to be totally loyal to the crown. Third, there was a need to convince the natives that loyal service to the crown was profitable and respectable. Lastly, apart from pure loyalty, the British Indian Army should be capable of facing the growing Russian threat.²² Lord Roberts, who served as the commander-in-chief of the Indian Army from 1885 to 1893, thus came up with a set of criteria for recruitment into the Indian Army: Manpower from the States of Punjab, Rajasthan, northern Uttar Pradesh, the hilly regions of northwest India (presently a portion of Pakistan) and North India were identified as having been loyal during the Sepoy Mutiny, and were thus preferred for recruitment²³ The peasant class from the rest of India was also found to be sturdy, upright honest and reliable and so were also fit for army service. Certain categories from eastern, central and southern India, who were either directly or indirectly responsible for the Sepoy Mutiny were unfit for military service. Similarly, the Brahmins and Vaishyas from anywhere in India were unfit for military service as they were mainly responsible for starting the mutiny.

Roberts was no obscurantist or racist. His rules were in the best interest of the British crown. To give it credibility the whole policy was implemented under the guise of a term invented by Roberts called the 'Martial Race' theory. It was widely propagated that only those castes and

racess would be recruited who have been historically known for their warrior qualities. This was not difficult to believe as most wars in Indian history were fought in the west, north and northwest - the only avenues open by land to an aggressor into India. It was also said that some races in the east and south had become unfit for military service as years of relative peace in these areas had made people timid and incapable of waging a war. Roberts even convinced his British colleagues that long years of peace, and prosperity attending it, had made many Indian races - as it always seemed to have made Asiatics - soft and incapable of coping with physical rigors.²⁴ Thus the races preferred were termed 'martial races' and the other as 'non-martial races'. As an additional incentive, soldiers at the end of their military careers were given large chunks of land called 'jagirs' for a paltry sum of money. Thus, the so called martial races became rich land owners over the years. The martial race theory, therefore, received wide acceptance, and even acclaim, all over India.

While the theory does not sound very convincing today, it is still believed to be somewhat true. The theory plays on human pride-which often blinds rational reasoning-hence in most of rural India, people pride themselves as being from a martial race. These martial classes look down upon non-martial races and feel agitated when asked to work with them.

Cultural characteristics need to be accommodated in any organizational structure to minimize friction.

Elaborate management will be necessary when people from different religions, castes and classes are grouped together. The 'family orientation' of Indian culture suggests structures such as the "regimental-team" for the armed forces. Maintaining harmony necessitates the best quality of leadership. Induction of women into the armed forces may pose problems.

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SECTION THREE: GEOGRAPHICAL IMPERATIVES FOR INDIA'S SECURITY

In order to understand the extent to which India's geography influences its military element, it is necessary to determine those fundamental pre-requisites or imperatives that are essential to India's security needs and hence to its military element. Sections one and two of this chapter have dealt with the physical, economic and human components of India's geographic element. Using that as the backdrop, this section will deal with the fundamental inferences that can be drawn from each of those geographic components, that should have a bearing on India's military element. Whether or not they actually have influenced India's military element will be determined on examining the military element in light of these imperatives in the next section.

Imperatives from Physical Component of Geography

The entire northern belt is unproductive terrain. India would do well to work with its neighbors to declare this region a demilitarized zone. This would be in the interest of India and its neighbors and would permit concentration of efforts to improve the pathetic economical conditions in the region.

Notwithstanding the above option, the geostrategic position near any nation other than dedicated allies

requires defense along the mountain line on its northern border.

The northern mountainous terrain dictates the necessity of light infantry units for this region as mechanized units are not suitable for operations here. Similar light infantry units will be necessary for operations in the eastern jungle region.

For any requirement to project forces across the northern mountains, India would need capabilities other than ground forces.

Integrity of borders at high altitudes in the north requires permanent forward deployment. The restricted lines of communications in this region will not permit units to reach required locations in tactically acceptable time frames from garrisons further south.

India's location, size and availability of resources in this area provides it an option and responsibility to assist in regional stability of smaller countries around it.

In the eastern jungle terrain, use of light armor will provide additional capability to forces operating in this region.

The vast coast line and island territories require a navy capable of protecting its sea lines of communications, off-shore oil exploration facilities and for conducting anti-drug/anti-smuggling operations.

The plains of Punjab and the desert region in the west dictate the necessity for construction of artificial obstacles in order to strengthen defenses. This region also dictates the employment of heavy units in order to assure operational superiority.

Troops operating in the plains of Punjab need to be equipped and trained for river crossing operations in order to be effective.

Equipment has to be adequately sturdy to operate efficiently in the varying climatic and terrain conditions obtained in India.

With an unfriendly China possessing nuclear capability in the north, India could consider exercising the nuclear option as a deterrence.

Nuclear installations, power generating installations and off-shore exploitation facilities are strategic targets and need protection.

The varying nature of terrain suggest that military units would be better employed if deployed on a regional basis. Moving units from one region to the other will require acclimatization to the new region and extensive training to be able to operate in the various types of terrain.

India needs an adequate sized air force, capable of supporting ground and naval operations throughout widely dispersed regions of the nation.

Imperatives from Economic Component of Geography

With its mineral and energy resources and availability of technological manpower, India should endeavor to be self-sufficient in meeting defense requirements. Import of technology will be necessary to prevent obsolescence of its weapons and equipment as there continues to be a gap between India's technology and state of the art technology. Such imports should be kept to the barest minimum in order to save foreign exchange.

The existing nuclear facilities should be capable of producing nuclear weapons if India wishes to use the nuclear option as a means of deterrence against any belligerent neighbors known to possess nuclear weapons.

Imperatives from Human Component of Geography.

Regionalism, religious infighting and class/caste rivalry threaten India's internal security and the country must be capable of dealing with it.

The diversity of religions, classes/castes, calls for suitable policies with regard to recruitment, organization and composition of the armed forces. The force structure should accommodate the existing diversity while maintaining effectiveness.

India has adequate manpower to support a sizable armed forces. Conscription should not be necessary.

Suitable policies and plans must exist for recruitment to accommodate the unique Indian social structure and to draw suitable manpower for the armed forces. Special attention must be paid to attract technologically skilled manpower for certain trades/branches and positions in the armed forces.

Suitable policies for a common working language for the armed forces are necessary for standardization of training, for better interpersonal relationship and better coordination. A bilingual policy of Hindi and English may be the answer.

Space programs should be developed with the availability of technological manpower for use by the armed forces in the areas of guidance, communication and for providing real time intelligence. Such programs will be effective force multipliers to the armed forces.

The family orientation of Indian society suggests the regimental-team system for Indian armed forces.

The diversity of castes, classes, religions, religious infighting and the group orientation of the Indian masses place a heavy responsibility on military leadership. The armed forces would do well to develop an officer corps of the highest quality. Suitable policies for promoting effective military leadership to senior levels are mandatory.

Effective measures to prevent the malices of Indian society from creeping into the armed forces would be useful to maintain cohesion and efficiency within the organization.

SECTION FOUR: INDIA'S MILITARY ELEMENT AS IT EXISTS TODAY

Composition of India's Armed Forces

India's regular armed forces are the fourth largest in the world, ranking behind those of the United States, Russia and China. Presently, the active component is 1,262,000 supplimented by the reserves of the Territorial Army being 160,000.¹ In addition, the country has a 832,000 strong para military force. A coast guard force is also in formation and will have 25,000 personnel. The actual naval component has 52,000 personnel including a 5,000 strong naval air force and 1,000 marines.² The active air force component accounts for 110,000 personnel.³ Service in the armed forces is voluntary and there is no conscription.⁴

The army organization has two armor divisions, one mechanized division, 19 infantry divisions (light) and 11 mountain divisions. In addition, there are 14 independent (separate) brigades, five armor brigades, seven light infantry brigades, one mountain brigade and one airborne/commando brigade.⁵ These formations (units) comprise: 53 tank regiments (battalions), 19 mechanized and 332 light infantry battalions, nine airborne/commando battalions; 164 artillery regiments (battalions) to include: one heavy battalion, five multi-barrel rocket launcher battalions, 50 medium artillery battalions (including 11 self propelled

battalions), 69 field artillery battalions (including three self-propelled battalions); 29 air defense regiments (battalions), 10 SAM groups of three to five batteries each; seven squadrons with 25 flights of air observation helicopters; six anti-tank helicopter squadrons and four liaison helicopter squadrons.⁶

The 52,000 strong navy comprises 19 submarines, two carriers, each capable of carrying eight Sea Harrier fighter aircraft and an equal number of Sea King helicopters. It also consists of five destroyers of the Soviet Kashin class, twenty frigates mostly of the U.K. Leander class and Soviet Petya class. There are 37 patrol and coastal combatant ships, 12 missile craft, 20 mine warfare craft, 20 mine counter-measure vessels, 10 amphibians and 18 support and miscellaneous vessels.⁷ The naval air arm comprises a total of 41 combat aircraft and 73 armed helicopters. At present, there are 1,000 marines organized into one battalion and a second battalion is in formation.⁸

The Indian air force, with a total of 110,000 personnel, is organized into five air commands. It comprises one light bomber squadron with nine Canberra aircraft; twenty-six fighter ground air craft squadrons with 400 assorted aircraft including the indigenous Ajeet, Marut, the British Jaguar, the Soviet MiG-21, MiG-23 and MiG-27. There are 22 fighter squadrons with 361 aircraft to include the MiG-21 BIS, MiG-23 MF, MiG 29 and the French Mirage 2000

H.⁹ The maritime attack element includes eight Jaguars and twelve Mi-25 helicopters (HIND). In addition, there are three squadrons of reconnaissance aircraft and two survey squadrons. The Transport arm consist of 13 fixed wing aircraft squadrons with 196 aircraft to include the An-12B, An-32, BAe-748, DHC-3, DHC-4, DO-228 and Il-76s; the rotary wing element has 11 helicopter squadrons with 140 helicopters comprising Mi-8, Mi-17 and Mi-26 Heavy Transport helicopters. In addition, there is one VIP squadron with Boeing 707, 737 and BAe-748s; one liaison flight with BAe-748 and C-47 aircraft and around 400 assorted training aircraft.¹⁰ The missile arm of the Indian airforce includes the air-to-surface Exocet Missiles, AS-7 Kerrys, AS-11B (ATGW), AS-30 and Sea Eagles. The indigenous 'Akash' is in the process of induction into the air-to-surface category. The air-to-air missiles include the AA-2 ATOLL, AA-7 APEX, R-550 MAGIC and the Matra Super 530D. The surface to air missile component, with 30 battalions, consists mostly of V755M/VK (SA-2) and the SA-3s.¹¹

The breakdown of India's large para-military forces is shown in Table 2 below:

TABLE 2: INDIA'S PARA MILITARY FORCES¹²

Name of Force	Number of Personnel	Roles/Tasks
National Security Guard (MSG)	5,000	Anti terrorism contingencies
Central Reserve Police Force (CRPF)	250,000	1. Internal Security 2. First line army reserves (along with Territorial Army).

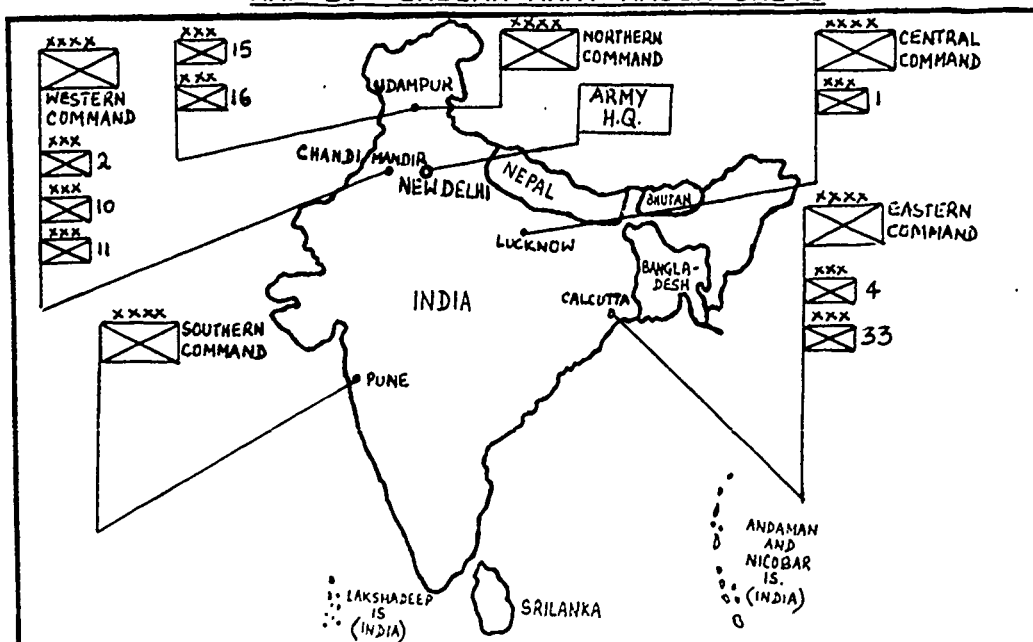
Border Security Force (BSF)	90,000 (An additional 45,000 under raising in 1991-92)	1. Manning the border 2. Internal security 3. Second line army reserve
Assam Rifles (AR)	40,000	Same as BSF but restricted to the eastern region.
Ladakh Scouts (LS)	5,000	Same as BSF but restricted to the northern region.
Indo-Tibet Border Police (ITBP)	14,000	Same as BSF but restricted to the northern region.
Frontier Force (FF)	8,000	Same as BSF but restricted to north eastern region.
Central Industrial Security Force (CISF)	70,000	1. Security of industrial facilities. 2. Third line army reserve.
Defense Security Force (DSF)	30,000	Security of only defense installations
Railway Protection Force (RPF)	70,000	Railroad protection
Provincial Armed Constabulary (PAC)	250,000	1. Internal security roles. 2. Army reserve as a last resort.
National Rifles	Under Raising in 1991	Internal security

ORGANIZATION, RECRUITMENT, TRAINING AND TERMS/CONDITIONS OF SERVICE

Organization, Command and Control. The Indian armed forces are under strict civilian control. The President is the commander-in-chief of the armed forces. The Ministry (Department) of Defense is headed by a minister (secretary) who is a civilian politician. He exercises direct control over the heads of the various services. Each service has its own headquarters headed by a service chief (a 4-star) located in the capital city of New Delhi. At present, there is no joint organization like the United States Joint Chiefs of Staff (JCS), but mechanisms do exist for joint planning and execution at division level upwards.

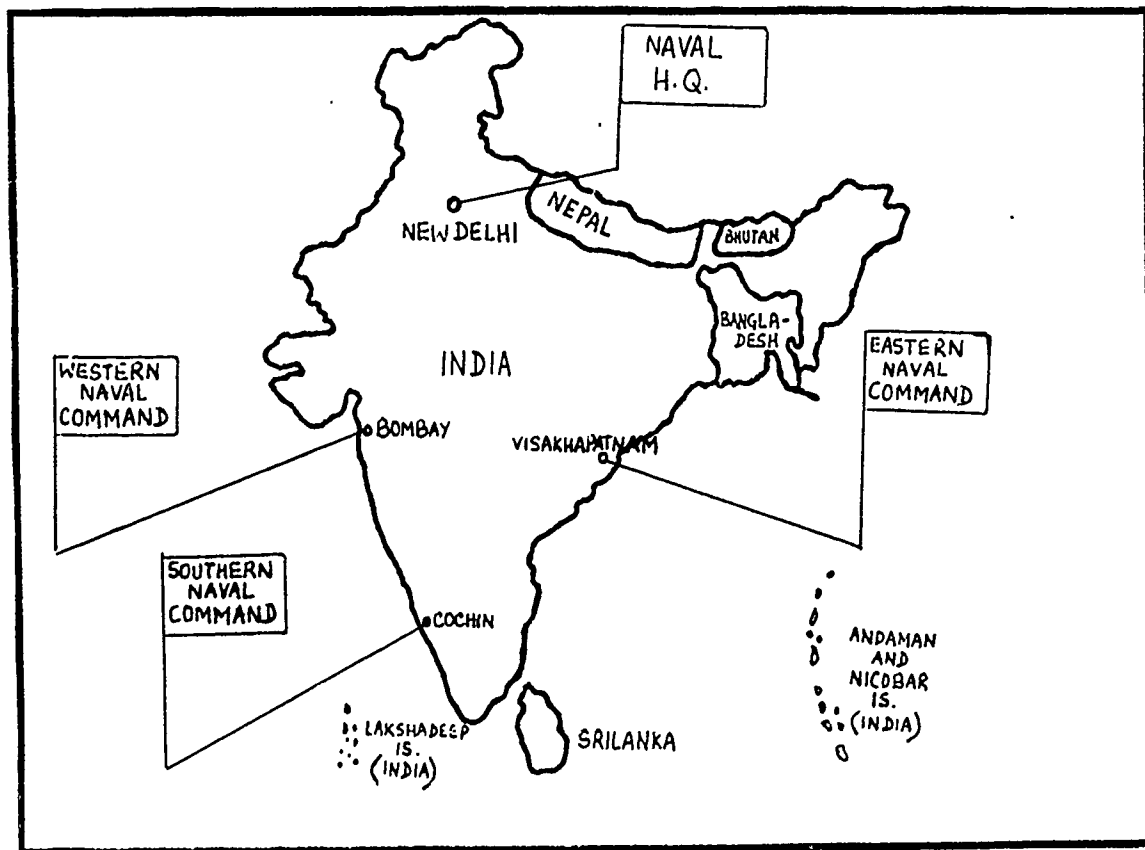
The entire country is divided into five Army commands, each of the size of a field army and headed by a Lieutenant General. Each command is responsible for operations in its geographic area of responsibility. The various military commands are: The Northern Command with headquarters located at Udhampur for operations in the Jammu and Kashmir region, the Eastern Command with its headquarters located at Calcutta for operations in the eastern region, the Southern Command with its headquarters located at Pune for operations in the southern region and portions of the western (desert) region, the Western Command with its headquarters located at Chandimandir for operations in the western region and a Central Command with its headquarters located at Lucknow is responsible for the central region. Map 2 shows these locations and gives an idea of various units comprising each of these Commands.

MAP 2: INDIAN ARMY-MAJOR UNITS¹³



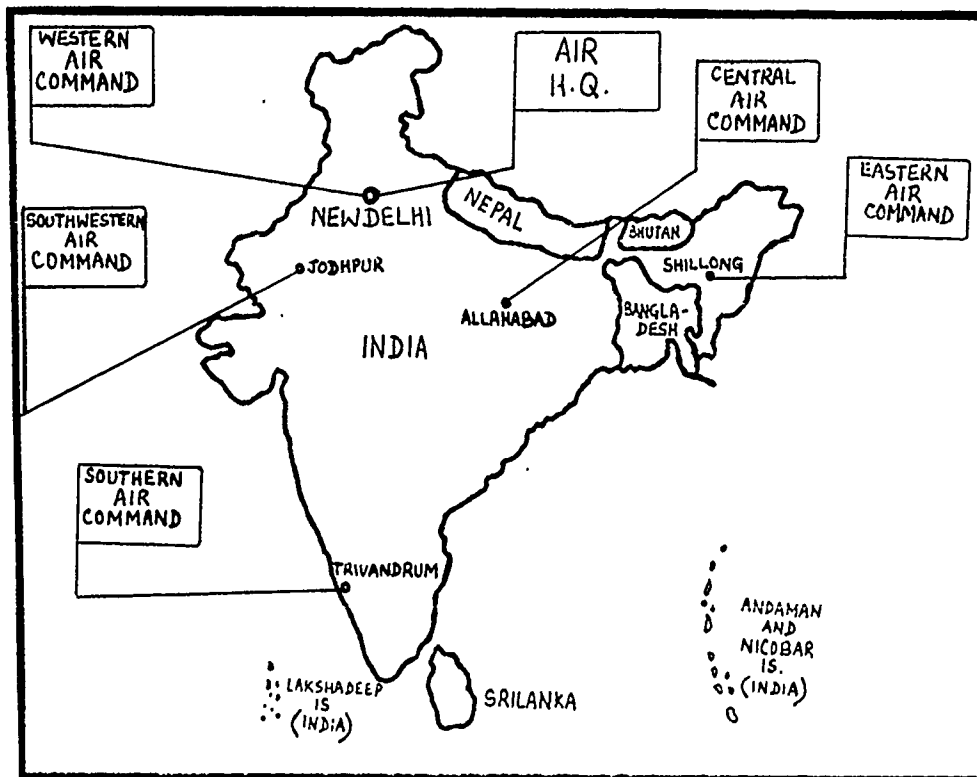
The naval forces are spread over three naval commands each headed by a three star Admiral. These are: The Western Naval Command with headquarters located at Bombay and responsible for most of the west coast, the Southern Naval Command with headquarters located at Cochin and responsible for the southern coastal region from Goa to Madras including Lakshadeep Islands, and the Eastern Naval Command headquarters located at Visakhapatnam and responsible for the east coast including the Andaman/Nicobar Islands. Map 3 shows the location of these naval commands.

MAP 3: INDIAN NAVY-COMMANDS¹⁴



The Air Force has five operational air commands each headed by a three star Air Marshall. These are: The Western Air Command with its headquarters located at Delhi is responsible for the northern and most western regions; the Eastern Air Command with its headquarters at Shillong is responsible for the eastern region; the South-western Air command with headquarters at Jodhpur is responsible for parts of the western and southern regions; the Southern Air Command with its headquarters at Trivandrum is responsible for maritime air support and the Central Air Command headquartered at Allahabad is responsible for other parts of India and is also the reserve air command. Map 4 shows the locations of India's Air commands.

MAP 4: INDIAN AIR FORCE-COMMANDS¹⁵



Organization of Units In the Army. In the Indian Army today, the older Infantry Regiments are virtually one-class units, but the combat support arms (armor, artillery, engineers and signals) and logistic support services (ordnance, electrical/mechanical engineers, medical corps and so on) do not have rigid class composition but are more broad based in their recruitment. Some 60 percent of the Army, comprising combat support arms and logistic services, have come to have mixed composition of soldiers from different classes and regions. Class composition has been more pronounced in the infantry, but while the organization of the old regiments has been left unchanged, it was decided after independence that any new regiments being raised would have a mixed class composition. Accordingly, the Brigade of Guards and the Parachute Regiment, which were raised in the late forties and early fifties, were organized as such. Much later (in the seventies) the mechanized infantry units were raised with mix-class composition. Opinion in the army has been divided on the issue of regimental class composition. Single-class regiments have greater cohesiveness and distinguished traditions - great values during the strain of battle. However, mixed class regiments too have performed well in battles fought since independence.¹⁶

What must be stressed is that both in the old as well as the new regiments, their officers are from all possible

backgrounds, from all parts of the country, and they completely identify themselves with the class of their regiment.¹⁷

Recruitment. Recruitment is voluntary. The country is divided into recruiting zones and sub-zones. These zones and sub-zones are allotted vacancies each year (based on retirement/death rates) which are laid down by branch and trade. The sub-zones and zones recruit men and dispatch them to regimental centres for recruit training and further absorption into units. Every unit also has carpenters, blacksmiths, sweepers, barbers, cooks, and so on for administrative jobs. Such jobs are performed by men of that particular caste/sub-caste and are recruited as such. However, for military trades as gunnery, tank/APC driving, telecommunications etc, recruitment is based on choice and qualifications and hence manpower is drawn from all classes of society. The armed forces has a majority of Hindus; of the minority religions, the Sikhs comprise the major portion.

Training. Each branch has its regimental/branch centres. These are fed by recruiting zones and sub-zones. At these centres, basic training is imparted for one year after which trained recruits are fed to battalions. Battalions form part of brigades and divisions. Once men are amalgamated into battalions, they receive 'on the job' training and are then fully fit combat soldiers. For

further training and specialization, they are sent to various schools of instruction for specialist/advanced training. English and Hindi are the working languages of the army. All documents and material are in English and Hindi.

Officers. India has a good corps of officers in its defense services. Relative to the officer corps in the south Asian region, they rank high in professionalism.¹⁸ Officers graduate from one of the five academies India has (a joint service academy at Pune, an army academy at Dehra Dun, another army academy at Madras, a naval academy at Coimbatore and an air force academy at Bider). As mentioned earlier, officers in the army are allotted the branch of their choice, immaterial of their religion, caste or creed.

Great stress is laid on officer training with emphasis on developing them into professional, fighting leaders. A large number of military training establishments with a fine record of tradition and effectiveness exist, to train them both individually and collectively.¹⁹

The promotion criteria for officers are based on three aspects: first, on their ability to absorb professional knowledge, which is judged by their performance on various courses of instruction; second by their performance in training exercises; and lastly, by their overall performance each year, which is reflected in an annual confidential report initiated by the commanding

officer and reviewed at two levels above the unit to which the officer belongs. A number of officers are sent, after a highly competitive selection process based on merit, to attend courses in foreign countries. Officers of the Indian Armed Forces at present attend courses in the United States, U.K., Canada, France, Australia and Indonesia. The army headquarters at New Delhi maintains a computerized dossier on each officer and is responsible for deciding an officer's employment/promotion. In addition, officers have to pass promotion examinations at various levels during their service career. Promotion up to the rank of major is automatic and time phased, after which, promotion boards are held to screen each case for further promotion. An officer gets three looks for each promotion beyond the rank of major. Similar criteria and policies exist in the Navy and Air Force.

Territorial Army and Para-Military Forces. India's large reserve component comprises the Territorial Army and various para-military forces (See Table 2 on page 54-55 for details). These are a reserve for the army and a second line force for police duties, and internal security roles. They are controlled by the Ministry of Home Affairs - a department of the government responsible for internal affairs.

Terms and Conditions of Service. The philosophy of terms and conditions of service is based on the need to keep

the armed forces young. For example, a major has to retire at the age of 48, a lieutenant colonel at 50, a full colonel at 52 and so on. A similar scale exists for enlisted men. Service personnel are well paid and are entitled to free medical facilities. Housing is subsidized and free rations are authorized to the serving individual. Technological personnel receive an additional allowance because of their qualifications. On retirement, personnel are authorized a pension (retired pay) which is based on a sliding scale depending on the number of years served and rank at retirement. Free medical facilities and PX facilities are available even after retirement. Similar perquisites, albeit at a reduced scale, are authorized to personnel of the Territorial Army and para-military organizations.

Weapons and Equipment - Manufacturing, Procuring Policies

India has built up a fair sized infrastructure for defense production and technological development. Promotion of science and technology has been important. Indian science and technology have been dominated by eight major agencies.²⁰ These are:

- Council of Scientific & Industrial Research
- Indian Council of Agricultural Research
- Department of Space
- Defense Research and Development Organization
- Department of Atomic Energy

- Department of Science and Technology
- Department of Electronics
- Indian Council of Medical Research

All these agencies support India's defense sector in one way or the other. India is a major manufacturer of a variety of defense equipment. It also imports military hardware. Such acquisitions are governed by political and techno-economic conditions. Department of Defense production and supplies constitutes 14% of the defense expenditure. The Indian defense industry includes units involved in manufacturing tanks, weapons, aircraft, missiles, electronic equipment, building ships and repair/rebuilding facilities. India's acquisition of armament and equipment has included imports from the USSR, USA, UK, France, Sweden and Germany. Most deals include licenses to manufacture the imported hardware in India.

Mobilization, Deployment/Employment Philosophies and Doctrine

Mobilization. Indian armed forces mobilization philosophy resembles that of China. Mobilization plans are drawn up by the three service headquarters at New Delhi, after political approval. The two components that mobilize in the event of conflict are the active component and the para-military forces. Personnel of both these components are on full-time duty and have no alternate vocation. Thus,

mobilization is relatively simple. It is a question of moving out from garrisons, where they are stationed, and occupying battle positions. To facilitate speedy mobilization, units hold all their combat equipment at all times. Adequate road and rail communications exist, to support this type of mobilization except in the Northern Himalayan region. Units responsible for protecting land frontiers along this northern region are permanently stationed in their battle positions. Similarly, naval units are stationed along the coastline, in order to allow them to mobilize with speed.

Deployment/Employment. The basic philosophy for deployment and employment are as follows:

Units along the border belt, (along the northern borders) occupy battle positions permanently. A minimum presence of 60% of the unit strength has to be 'in place' at all times. In other areas, a minimum strength varying from 5% to 7% is located on the borders with the rest being stationed in garrisons that are between 30 miles to 200 miles from the border. Units earmarked for an offensive role are located in the region of central India - (the Indo-gangetic plains) and on mobilization, they move forward on warning, to deploy along the border when required for tactical employment. There are five para-military forces that constantly man border outposts along the entire Indian border. These are, the Border Security Force (BSF), the

Assam Rifles (AR), the Indo-Tibetan Border Police (ITBP), the Ladakh Scouts (LS) and the Frontier Force (FF). Personnel of these forces are usually locals, indigenous to areas in the vicinity of the border, hence they are in close proximity to their homes and families. Their roles are anti-smuggling, anti-drug operations and prevention of illegal immigration.

A study of the Indian armed forces operation in the Indian Ocean archipelago of Maldives in 1988 gives one a fair idea of the Indian armed forces mobilization, deployment/employment philosophies. On 3 November 1988, a band of 600 mercenaries, in four merchant ships, armed with automatic weapons, light mortars and hand held anti-tank weapons, invaded the Indian ocean archipelago of Maldives, in an attempt to overthrow the legally constituted government headed by President Gayoom. The President made immediate appeals to India, the U.S.A. and the U.K. to save the situation.²¹ The mercenaries, backed by self-seeking businessmen of Maldives, had overpowered the 1,200-strong security guards of Maldives by midnight and were combing the capital city of Male in an attempt to locate President Gayoom and to flush out remaining security personnel.

India responded to the appeal and dispatched 1,500 paratroopers who were flown out of India and dropped in Maldives on 4 November 1988, about 18 hours after the attempted coup began. The Indian force was able to crush

the mercenaries' endeavor within four hours. Most mercenaries were captured and some killed. About a hundred of them fled the island in two of their merchant vessels only to be tracked and captured by Indian Naval gunboats, a naval commando (marine) task force and naval helicopters.²²

Most Indian troops pulled out in early December 1988 but at the request of President Gayoom, a 400-man force continued to remain in Maldives for one year. During this time, the force assisted the Maldivian government in screening the population to identify dissidents associated with the attempted coup and to re-vamp the local rickety security guard.²²

The abortive coup in Maldives revealed India's capability to put down unrest in the region through rapid deployment of forces by aircraft and naval vessels. It also demonstrated India's ability to pull out reserves for an emergency from an army that was already stretched on the western, northern and eastern border regions and in Srilanka at the same time.²³

Doctrine. India's military doctrine is derived from its security strategy, which in turn is based on its security perceptions. The basic security threats from India's point of view are: use of Indian soil as sanctuaries by insurgent groups within or from outside India; the threat of a Chinese attack from the north and Chinese claims on territories

along the Sino-Indian border; the problems with Pakistan along the western border (particularly in the Jammu and Kashmir state) which could result in a war; internal disorder due to religious animosities and inter-caste/class rivalry; and lastly, transgression of territorial waters and the extended economic zone by powerful nations of the developed world.²⁴ In essence, India's perceived threats can be classified into four broad categories: the external threat of a Chinese aggression in the north, the external threat of a war with Pakistan on the western border, threatening military presence in the Indian Ocean and, lastly, internal strife within the country. The Indian strategic community feels that while it is ideal to ensure peaceful relations with at least one belligerent neighbor - if not both - the country should build its military strength to deter both China and Pakistan from attacking independently or jointly, and, if they do so, to defend itself successfully.²⁵ It is also felt that the country should strengthen its naval capability to protect the country's interests in the Indian Ocean and finally, that every effort should be made to reduce, and finally eradicate (if possible) internal security threats. The armed forces and para-military forces are accordingly shaped to cater for any contingency.

India's military doctrine is based primarily on protection of the homeland. Hence defense is considered the

basic operation of war. However, it is also surmised that conclusive results in war are only achieved through offensive action. Hence offensive operations are given due importance as well. Military operations advocate a combined arms approach at two levels, viz., the tactical level, which includes operations of echelons up to corps, and the strategic level, which comprises operations at echelons above corps. There is yet no emphasis on the term 'operational level'. The assumption is that tactical operations at division and corps level correspond to operational level, without having to call it as such.

Indian military thought revolves around ten principles of war; viz., selection and maintenance of aim, concentration, coordination, speed, maintenance of momentum, offensive action, flexibility, effective leadership, surprise and security, and sound logistical support. Operations of war are guided by basic considerations (tenets) and there are a set of considerations advocated for the planning and execution phases of each operation. The operations of war as practiced are: defensive operations - static and mobile; offensive operations to include river/obstacle crossing operations; and retrograde operations. The doctrine emphasizes the need to conduct sustained operations suitably synchronized at all levels over a number of fronts. Conventional forces are seen as the option in the event of war. Efforts are underway to integrate the

country's space programs to military doctrine with the emphasis being on obtaining real-time intelligence.

As a result of its doctrine, a bulk of the country's 19 infantry divisions and all its 11 mountain divisions occupy defenses in place along the northern Himalayan belt and the eastern jungle region. Divisions in the eastern region each have a squadron of armored cars integral to their organization. Divisions in the western sector are a mix of light infantry and heavy divisions and have a defensive role. A portion of the army including the two armor divisions are located in central India. In sum, India's military doctrine is developed to be relevant and capable of application in any foreseeable conflict environment.²⁶

As a contextual example to understand India's doctrine, it would be prudent to examine the armed forces performance in war. The last war fought by India was the Indo-Pakistan war of 1971. A broad study of this war at this point is therefore relevant.

The British in 1947 divided India into two segments prior to their departure from the sub-continent. The result was the formation of West and East Pakistan with India between the two. (See Map 1 on page 19). Bangladesh was the erstwhile East Pakistan. Pakistan's common religion of Islam could not overcome the deep divisions of geography (East and West Pakistan were separated by a thousand miles),

culture and political goals. East Pakistan demanded secession from West Pakistan in early 1971. Army reinforcements from West Pakistan were sent to East Pakistan to ensure they did not secede. The troops acted with great harshness. A large number of refugees from the eastern portion poured into India in an area where India's own people were impoverished. Indian troops were mobilized and deployed in the eastern region to control the influx of refugees. By August 1971, the eastern wing of Pakistan moved toward insurrection and war.²⁷ Pakistan decided that the situation was intolerable and saw war with India as the only hope of preventing a split between its eastern and western wings. Accordingly, she declared war with India on 3 December 1971 and attacked India in the western sector. Pakistan's overall strategy was to defend long enough in the east to gain support from either the U.S. or China. Second, to attack in the west and capture enough territory so as to strengthen its bargaining capacity after the war.

India's overall strategic aim was to ensure stability in the region by realigning the security system in accordance with geographic realities and to support the desires of the masses. India was also concerned with bringing the war to a quick end by offensive action against Pakistani troops in the east while maintaining a defense in the west.

The theater of war was divided into two fronts: the western front (forces in and around the West Pakistan/India

border), and the eastern front (forces in and around East Pakistan/India border). The western front consisted of four segments from the cease-fire line in Jammu and Kashmir in the north of India to the marshes of the Rann of Kutch south of Rajasthan.

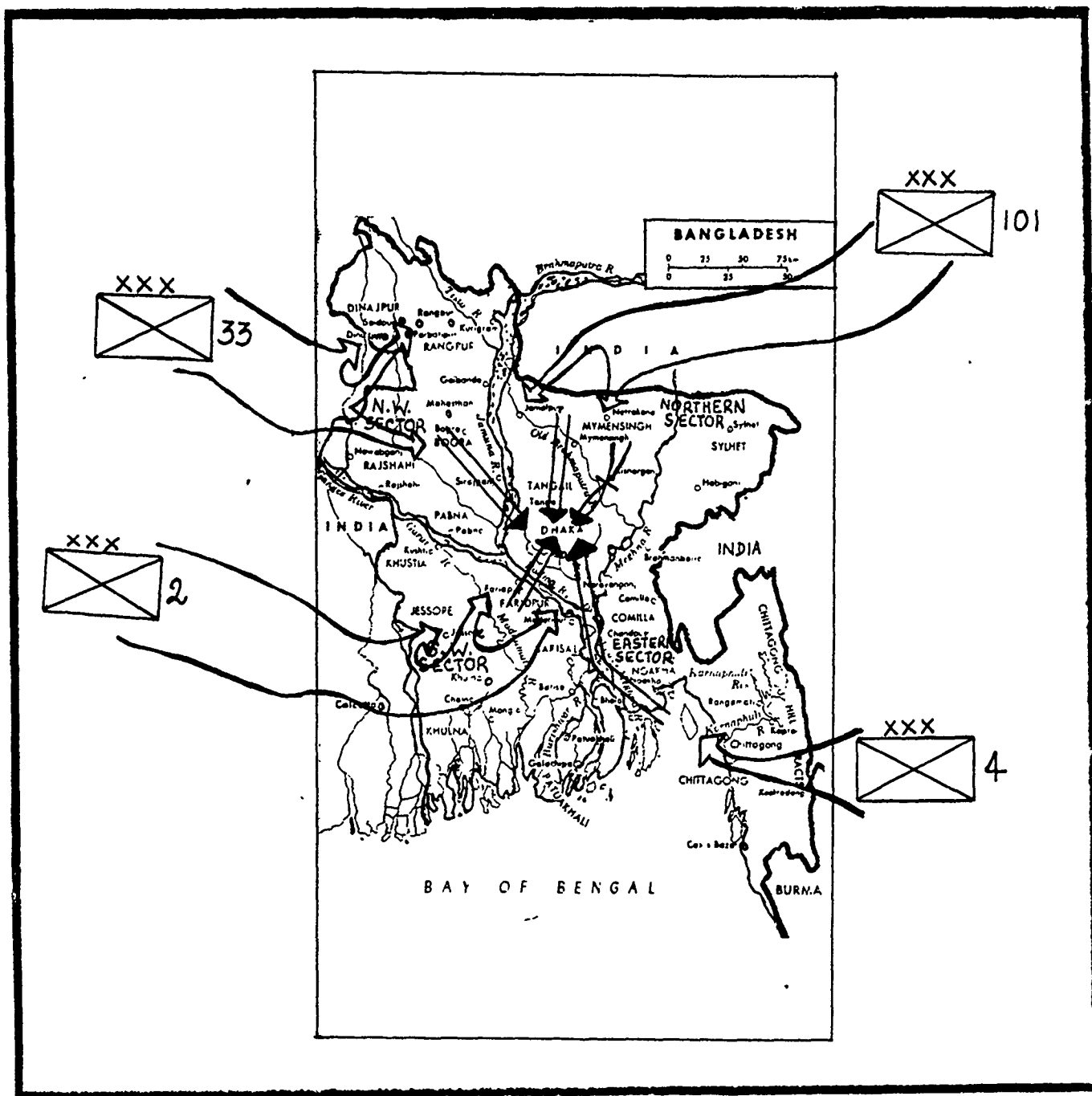
The eastern front was divided by three rivers into four segments (also see Map 5). The Jamuna River runs north to south and cuts East Pakistan in half. West of the Jamuna, the Ganges river flows west to east and joins the Jamuna at Dhaka, completing the four-way partition. The segments were as follows: 1) North-Western sector, 2) South-Western sector, 3) Northern sector, and 4) Eastern sector.

The Chief of Army Staff at the time was General S.H.F.J. Manekshaw. General Manekshaw's plan complemented India's overall strategy. His plan was to concentrate maximum effort for offensive operations against East Pakistan and exercise an economy of effort by adopting a general defensive posture in the west.²⁹

General Manekshaw had three important operational advantages inherent in his plan. First, he had the ability to operate on interior lines of communication between both fronts. Second, he was able to attack East Pakistan from all sides. Third, he was able to make use of the Mukti Bahini (Bangladesh Resistance Organization) and thousands of irregulars, freedom fighters and a friendly local populace in and around East Pakistan.³⁰

MAP 5: 1971 INDO-PAKISTAN WAR OF 1971

EASTERN FRONT²⁸



Although some of the fiercest fighting of the war took place on the western front, to include the largest tank battle of the war, the decisive front was in the east. Hence, focusing attention to this front will enable an understanding of the effectiveness of India's doctrine to conduct the war successfully. It should be noted that for India to achieve overall strategic victory it was necessary that the defensive operations in the west be linked to the offensive operations in the east and that each be operationally successful.

Army forces were deployed to the various sectors of the Eastern Front as shown in Map 5.

The task given to the Indian forces in East Pakistan was to destroy the bulk of the Pakistani forces in the eastern theater and to occupy the major portions of east Pakistan.³¹ In order to accomplish this, the campaign plan called for Eastern Command forces to attack from all directions, to break East Pakistan into fragments and then drive directly on to Dhaka as fast as possible.³²

In the North-western sector, 33 Corps was to cut Pakistani communications in the Dinajpur/Rangpur sector and if the situation permitted to attack and capture Bogra. In the South-western sector, 2 Corps was to advance eastward, secure Jessore and Jhenida and then launch attacks to capture Khulna, Harding Bridge, Faridpur and Goalundo Ghat ferries. In the Northern sector, 101 Communication Zone

(corps size) was tasked to make a thrust toward Jamalpur, with a diversionary movement to Mymensingh. In the Eastern sector, 4 Corps was to clear the sector east of the Meghna river and then capture Chittagong.³³

The attack began on the morning of 4 December. Although there was success in all sectors, the most dramatic was in the east by 4 Corps. In less than a week, 4 Corps had secured the cities of Chandpur and Dandkandi on the eastern side of the Meghna River and by using a combination of local river craft and helicopters, had crossed the river to secure Narsingdi. This effectively cut the link that Pakistani had with the sea, and placed the Indian Army 4 Corps within final striking distance of Dhaka (about 12 kilometers). A good testament to the success and synchronization of operations in the 4 Corps area is provided by Maharaj K. Chopra:

In record time, the Indian Army mustered more than a corps in this [eastern sector] forbidding area. After a few skirmishes close to the border, this force had rather an easy time fanning out for a short-sword thrust directed at Dhaka. It was in this zone that the Pakistanis began to surrender en masse.³⁴

The concluding thrust to Dhaka, however, was to be made by Indian Army units from the north.³⁵

Although Indian forces in the north were held up at Mymensingh until 11 December, they were eventually able to drop a parachute battalion into Tangail, secure Tangail and cut the Pakistani northern withdrawal route from Dhaka.

Pakistani resistance at Tangail collapsed on the 12th and by the 16th of December Indian Army units had advanced to the outskirts of Dhaka. On 16 December the commander of Pakistani forces in Dhaka signed an unconditional surrender. The Indian Army had secured an impressive military victory and the country of Bangladesh was a reality.

As a test of India's doctrine, this war showed that the Indian Army could rapidly move across land whose trafficability was poor and strike at an objective (Dhaka), from several different directions, with several corps size units operating in concert with each other.

The Nuclear Option Factor. The nuclear option, of late, has been in focus in India. China's nuclear arsenal and the possibility of Pakistan acquiring nuclear capability have led to nationwide debates on whether or not India should produce nuclear weapons. The national position vis-a-vis nuclear weapons is quite ambivalent. It already has become a "threshold power." According to its leaders, it needs only to "turn a screwdriver" to start producing nuclear arms.³⁶

Missile Technology and Development. On May 22, 1989, India tested its first intermediate range ballistic missile (IRBM) called "Agni."³⁷ Agni in the Indian language Hindi stands for "fire." The range of such missiles, as classified by the INF treaty is between 500 kilometers to

5,500 kilometers. It would be reasonable to assume that the 'Agni' would have a range of somewhere in the region of 2,500 to 4,000 kilometers. The success of the test launch proves India's technological advancement and also its capability to project power by means other than ground forces. 'Agni' is part of India's Integrated Guided Missile Development Program (IGMDP) first launched in 1983. It includes so far, research and development of a family of missiles to include the 'Agni', the 'Prithvi' (Hindi for earth), which is a surface to surface missile, the 'Akash' (Hindi, for sky) and the "Trishul" (which in Hindi is a three pronged lance), both of which are surface-to-air missiles and the 'Nag' (which in Hindi stands for a cobra snake) which is an anti-tank missile.³⁸ Supporting the missile effort is a Space Department which has launched a number of indigenously manufactured satellites into space.

Defense Research and Development Infrastructure.

Defense Research and Development Organization. The Defense Research & Development Organization (DRDO), in its present form, came into existence in 1958 through a process of integration and consolidation of scientific and technical establishments then existing under the Defense Science Organization.³⁹

Today there are 47 Laboratories in the DRDO family. Their names and location are given in Table 3. These

laboratories are truly sub-continental in their distribution, from the deserts of Rajasthan to the rain forests in the east, from the frigid cold of the Himalayas to the warm waters in the peninsular tip. Recently created laboratories are in the area of advanced computing and artificial intelligence & robotics.⁴⁰

TABLE 3: LIST OF DRDO LABORATORIES/ESTABLISHMENTS
IN INDIA⁴¹

DELHI CLUSTER

1. Defence Science Centre (DSC)
2. Solidstate Physics Laboratory (SPL)
3. Institute of Nuclear Medicine & Allied Sciences (INMAS)
4. Defence Institute of Physiology & Allied Sciences
(DIPAS)
5. Institute of Systems Studies & Analysis (ISSA)
6. Defence Institute of Fire Research (DIFR)
7. Defence Scientific Information & Documentation Centre
(DESIDOC)
8. Defence Terrain Research Laboratory (DTRL)
9. Scientific Analysis Group (SAG)
10. Defence Institute of Psychological Research (DIPR)
11. Computer Centre, Delhi
12. Analytical Studies Group (ASG)

BANGALORE CLUSTER

13. Aeronautical Development Establishment (ADE)
14. Gas Turbine Research Establishment (GTRE)
15. Electronics & Radar Development Establishment (LRDE)
16. Defence Bio-Engineering & Electro-Medical lab (DEBEL)
17. Centre for Aeronautical Systems Studies & Analysis
(CASSA)
18. Centre for Artificial Intelligence and Robotics (CAIR)
19. Advanced Systems Integration and Evaluation Organization
(ASIEO)
20. Computer Centre, Bangalore

HYDERABAD CLUSTER

21. Defence Research & Development Laboratory (DRDL)
22. Defence Metallurgical Research Laboratory (DMRL)
23. Defence Electronics Research Laboratory (DLRL)
24. Computer Centre, Hyderabad
25. Advanced Numerical Research and Analysis Group (ANURAG)

PUNE CLUSTER

26. Armament Research & Development Laboratory (ARDE)
27. Explosives Research & Development Laboratory (ERDL)
28. Institute of Armament Technology (IAT)
29. Computer Centre, Pune

NON-CLUSTERED LOCATIONS

30. Naval Chemical & Metallurgical Laboratory (NCML), Bombay

31. Aerial Delivery Research & Development Establishment
(ADRDE), Agra
 32. Vehicle Research & Development Establishment (VRDE),
Ahmednagar
 33. Defence Agricultural Research Laboratory (DARL), Almora
 34. Combat Vehicles Research & Development Establishment,
Avadi (Madras)
 35. Proof and Experimental Establishment, Balasore
 36. Defence Research & Development Unit (DRDU), Calcutta
 37. Terminal Ballistics Research Laboratory (TBRL),
Chandigarh
 38. Naval Physical & Oceanographic Laboratory (NPOL), Cochin
 39. Instruments Research & Development Establishment (IRDE),
Dehradun
 40. Defence Electronics Application Lab (DEAL), Dehradun
 41. Defence Research & Development Establishment (DRDE),
Gwalior
 42. Defence Laboratory (CL), Jodhpur
 43. Defence Materials and Stores Research & Development
Establishment (DMSRDE), Kanpur
 44. Defence Institute of Work Study (DIWS), Mussoorie
 45. Defence Food Research Laboratory, Mysore
 46. Defence Research Laboratory (DRL), Tezpur
 47. Naval Science & Technological Laboratory (NSTL),
Vishakhapatnam
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In self-reliant development of defense systems, the current goals of DRDO can be briefly described thus:

- design and develop contemporary systems;
(licensed production invariably has technology lags).
- have system design freedom; incorporate stretchability in systems, making them capable of functioning without breakdowns in all terrains and climatic conditions.
- meet technology imbalances in the environment;
(dynamic, includes meeting 'force multipliers'.)
- tap full Science and Technology (S&T) potential of infrastructure and resources of Government and private sectors.
- interact with national S&T plans.

Over the past 30 years of DRDO activity, a number of designs have gone into production; production ultimately is the touchstone of R&D. The cumulative production value of DRDO products, technologies and processes till 1988 has been estimated as Rs 2000 crores (at an average of Rs 10 per dollar, this works out to US \$2 billion).⁴² Some of these are listed below:

- Field Guns
- Small Arms and Ammunition
- Advanced Ammunition

- Radars
- Sonars
- EW Systems
- Digital Communication Network
- Combat Vehicles
- Bridges
- Advanced Materials
- Engineer Support

Some of the major systems under development today are:

- Main battle tank (Arjun)
- Surface to Air Missiles
- Naval Missiles
- Surface-to-Surface Missiles
- Anti-Tank Missiles
- Light Combat Aircraft
- Torpedoes
- ASW Systems
- Multi-barrel Rockets Launchers.

Work is also in progress in the development of major sub-systems and technologies:

- Aero engines
- Multimode Radar
- Composites and armor
- Microelectronics
- Night Vision Systems
- Signal and Data Networks

- Simulators
- Artificial Intelligence Systems

A few of the thrust areas in which DRDO has initiated research are:

- Training Aids for the Services
- Simulator Technology
- New Rotary Wing Concepts and Designs
- Underwater Systems
- Infra Red Materials, Devices, Systems
- Micro-wave circuits
- New Turrets for self-propelled guns
- Parallel Computing
- Robotics
- Lasers

The defense research and development infrastructure of India is evidence of its capability to apply science and technology very effectively for defense purposes.

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SECTION 5: RELATIONSHIP BETWEEN INDIA'S GEOGRAPHIC ELEMENT AND ITS MILITARY ELEMENT

This section deals with discerning the degree to which India's military element is influenced by its geographical element. This is done by matching the imperatives identified in section three to the military element discussed in section four.

Declaring the Northern Belt a De-militarized Zone. India has made no effort to work with China to declare the unproductive northern region (along the Himalayas) a de-militarized zone. The Indian point of view is that China continues to occupy 38,000 sq km of Indian territory in the Ladakh region in the North and Central Himalayas and lays claims to another 90,000 sq km in the east, besides being in possession of 10,000 sq km of Indian territory ceded to it by Pakistan in the north.¹ Of late, India and China have resumed their dialogue on the border problem. A permanent solution is far from sight and declaring the northern belt a demilitarized zone is further remote. The inability to reach a consensus impedes any pragmatic approach to the geographic realities of this region.

Requirement of Light Infantry Units for the Northern and Eastern Regions. India's 19 light infantry divisions and 11

mountain divisions more than adequately meet the requirement dictated by physical geography in the Himalayan region and the jungle terrain in the east.

Use of Light Armor for Jungle Terrain in the East. While jungle terrain in the east necessitates light units, the employment of light armor will increase the combat effectiveness of units. This is noticed in India's military element as the divisions in the east have armored cars integral to their organization.

Employment of Heavy Force For The Western Region and Other Plain Regions. The heavy element of the Indian armed forces includes its two armor divisions, one mechanized infantry division and some additional armor units. A study of India's doctrine and employment philosophy suggest that heavy forces are needed for operations in the western regions. This rationale is sound when related to the geographic features of the region which is conducive to heavy vehicular movement.

Deployment at Altitude In the Himalayan Region. Indian army units are deployed in place along the Himalayan region at all times. Quite obviously, military planners realize that the limited road network and the nature of terrain here preclude speedy deployment of troops from garrisons to

battle locations. The permanent stationing of troops in their battle locations is necessary due to geographic compulsions.

Force Projection Across the Himalayas. India's Air Borne element and its air lift capability can at best transport one light division by air and employ one airborne/air assault brigade at any given time. This is a limited capability to project power across the Himalayan mountain belt. However, its missile development program gives India the capability to project power into all of southern China and most of central China. The nuclear option, if exercised by India, gives it sufficient leverage to apply the strategy of nuclear deterrence.

Necessity For Sturdy Weapons and Equipment. The terrain and varying climatic conditions dictate that India's weapons and equipment need to be sturdy enough to function effectively. The quality of the country's weapon systems and their acquisition policies suggest that they do indeed place emphasis on sturdy, combat-worthy equipment. The research and development programs also match the need to develop and produce equipment capable of effectively sustaining the rigors of nature.

Regional Based Employment Philosophy. Units of brigade size and above are permanently based in various regions depending on their operational responsibility within the framework of India's security strategy. However, this arrangement lacks flexibility as it restricts the army's ability to deploy large number of units in areas/terrain they are not familiar with.

Requirement of a Sizable Navy and Forward Deployment. As enumerated earlier in this study, India needs to protect its off shore drilling facilities, insular territories, SLOCs and its coast line. The size and quality of the Indian Navy suggest that it is capable of performing these roles. The establishment of a naval base in the Andaman Islands and the naval presence in the Lakshadeep Islands further suggests that India is indeed, aware of the importance of these islands to the overall defense of the mainland. The Indian Navy is one of five major naval powers which are capable of sustained long range deployment of seaborne strike aircraft.² The recent establishment of an Indian coastguard similar to that of the United States, frees most of its main naval force fleet elements for long-range, open ocean force projection activities.³ This expansion of naval capabilities perhaps stems from India's perceived concerns that the presence of stronger naval forces in the Indian ocean is a threat to her maritime interests, and

India must, therefore, be capable of meeting them on equal terms. Admiral Tellis (U.S. Navy) feels that despite the large naval expansion currently underway, the Indian Navy is nowhere near acquiring the power projection capabilities that its critics often ascribe to it.⁴

Requirement of an Air Force to Support Operations Over Wide Geographic Areas. The physical geography of India dictates the requirement for an air force capable of supporting operations on the ground and at sea, over a wide geographic area. It would be worth noting that today, the Indian Air Force has five times the number of front-line combat aircraft as Britain's Royal Air Force.⁵ Its latest contract with the U.S. to indigenously produce a light combat aircraft (LCA) promises to give its air force a further boost. The Indian air action in the Maldives in 1988 showed its willingness to assist smaller neighbors and thus maintain stability. The organization, equipment and deployment of the Indian Air Force suggests that it is structured to accept such a responsibility.

India's role in Assisting Regional Stability. India has in the past displayed a willingness to assist countries in its neighborhood in maintaining stability. The operation in the Maldives in 1988 was one of many military missions carried out by India in the past at the request of foreign

governments. They include assistance to Bhutan in putting down a coup in the 1960s, to Bangladesh and Srilanka in the 1970s and once again to Srilanka from 1987 to 1990. This is evidence of the fact that it has accepted the responsibility, resulting from its status, for responding to friendly neighbors' requests to maintain stability in the neighborhood.

Defense Industry and Self Sufficiency in Defense

Requirements. The manufacturing capacity of India's defense industry suggests that the country is harnessing its energy and mineral resources to maximize defense production in an endeavor to attain self sufficiency. However, the inventory of its military hardware reveals that the country has been investing heavily on imports/acquisition of sophisticated foreign military equipment. Obviously, it has been unable to optimize a suitable blend of available technological manpower and availability of mineral/energy resources. Having said that, it must also be noted that India is making commendable progress in the fields of defense research and development. In all, the country has been endeavoring to make masimum use of available potential of the economic component of its geography.

Production of Nuclear Weapons. Sufficient nuclear facilities are presently available to India and are

supported by adequate reserves of strategic minerals. According to what its leaders have said, it should be possible for India to use the existing facilities to produce weapon grade material. The advanced missile program is already geared to provide delivery systems and the space programs could provide guidance systems to such weapons. This capability once again demonstrates the extent to which the country can exploit the economic component of its geography for military purposes depending on its needs/ perceptions.

Large Manpower Base To Support A Large Volunteer Armed Forces. India's large armed forces are based on voluntary recruitment. There is no conscription either for the active component or the reserve component. In addition, the country has felt the need to maintain a large quantity of paramilitary forces. The country has been able to have a large volunteer force as a result of a large population base.

Development of Space Programs for Military Needs. There is a lack of information to suggest that India's space programs cater to its defense needs in the fields of communications and intelligence. However, with the technological manpower available and a space department functional, it would be reasonable to surmise that the country would have plans to

amalgamate its space programs with its military needs. The established success of its missile program further suggests that this program is supported by the Indian Space Department. This author has every reason to believe that such policies are in the offing, if not already in force.

Policies To Accommodate Social Diversities In The Armed Forces. It would have been ideal for the armed forces to organize its units on an 'all India' basis, i.e., an altogether mixed composition. This would have contributed to national integration. But this is not the case. Many army units continue to be based on one class composition. Even units with mixed class composition have people from certain castes for some trades (cooks, sweepers, barbers, blacksmiths etc.) The recruitment pattern also caters to recruit manpower on a regional basis. This seems imperative as of now, because of India's social structure. Within the armed forces though, no distinctions are made with regard to caste or creed. The policy for accession of officers is based on merit and not on class/caste composition. This is a logical policy to ensure good quality of leadership. The recent trend to raise mixed class regiments (battalions) seems to be a policy that aims at national integration and to break away from the shackles of caste/class orientation. The homogeneous nature of the armed forces and their

performance indicates that policies within the services are fairly sound and accommodate social diversities.

Necessity For A Common Language For The Armed Forces. Hindi and English are the working languages within the armed forces. It has been noted that the medium of instruction is Hindi for ranks below commissioned officers and English for Officers. The bilingual concept is imperative to meet the low rates of literacy. Hindi is easy to learn for an Indian from any part of India as nearly all regional languages are derived from Hindi.

Need For Suitable Policies to Attract Technological Manpower For Certain Positions In The Armed Forces. It is noticed that the policy for recruiting technological manpower is based on qualification and individual choice of trade. This is a suitable policy to recruit technological manpower into the armed forces. Also, the pay/allowances and perquisites for the armed forces seem lucrative enough to attract personnel with technological backgrounds in a country where finding jobs is not an easy task.

Necessity To Develop Effective Military Leadership. The Indian armed forces have been concerned with developing effective military leadership. The emphasis is on professionalism and not on careerism. Promotion criteria

for officers is based on professional performance and is sufficiently competitive. The structure for professional education and advancement of officers is also well conceived and developed. However, beyond the imperative, the emphasis on traditions and traditional values is far greater than necessary. Such emphasis is again part of the Indian psyche and a result of its historical legacy.

In sum, the net influence of the various components of India's geographic element is evident in almost all facets of its military element.

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CHAPTER V

CONCLUSION AND COMMENTS

The purpose of this study was to determine the extent to which India's geography influenced its military element. The basic question to be answered was "To what extent does the physical, economic and human components of India's geography influence its military element?" In section five of Chapter IV, that question has been answered, i.e., India's geographic element does indeed influence its military element to a great degree.

It was seen that the net influence of the physical component of India's geography had influenced the shaping of its military element in the following manner:

In the size and organization of its army.

In the structuring and build up of its navy.

In the building up of its air force.

In the formulation and application of its mobilization plans.

In the formulation and application of its deployment and employment philosophies.

Its plans for force projection across the northern region by means other than ground movement.

However, certain facets of its military have been influenced by elements other than purely geographic realities. These include the following:

Military Presence in the Northern Region. If one were to go purely by geographic necessities, there is no reason for India to deploy its army along the Himalayan region. Indeed, there is no explicable rationale behind the Sino-Indian dispute over the border region, as none of the areas under contention are of economic use to either country. The failure on the part of India and China to resolve the dispute amicably has led to the militarization of this region. It is obvious that India's security perceptions, and not geographic compulsions, have prompted India to retain military presence in this region.

Naval Expansion. This study has established the need for India to have a navy large enough to protect its sea coast, off-shore facilities, island territories etc. However, reviewing the structure of the Indian Navy's expansion reveals that its size and planned capabilities are beyond the dictates of geography. Naval experts have said that India could well be endeavoring to achieve an effective "sea control" whereby its navy can enforce the complete denial of access routes available to its regional competitors like Pakistan, Bangladesh, Srilanka, Burma and Indonesia.¹ Secondly, it seems to configure a "sea

denial" orientation where, despite lacking the capability to destroy extra-regional fleets, it can inflict a level of damage that is disproportionate relative to the political gains sought by an alien power and so can utilize these perceptions to deter extra-regional application of naval power in the first place.² Once again, it is obvious that the country's security perceptions, national interests and goals have influenced naval structuring and expansion plans more than geographic necessities.

The economic component of India's geography has also had considerable influence on its military element. The mineral and energy sources available to the country, coupled with the availability of technological manpower, have enabled India to build a fair size defense industry and an elaborate defense research and development structure. However, the country is far from being self-sufficient in meeting all its defense requirements. It is also presently unable to produce weapon systems and equipment incorporating the latest state-of-the-art technology. As a result, it has been importing the latest technology/equipment from developed countries, resulting in the loss of the much needed foreign currency. Based solely on geographic considerations, one would expect the country to be self-sufficient in such high-tech systems. However, the lack of economic power coupled with the relative infancy of the country (India has

been independent only for 44 years now) have precluded it from achieving self-sufficiency.

The capacity to produce nuclear weapons using facilities presently available for peaceful nuclear purposes has also been seen as a possibility based on the economic component of India's geography. Possession of nuclear weapons will provide India a viable option to apply the strategy of deterrence against adversaries with a similar capability. However, when viewed in the overall context (beyond purely geographic realities), making a decision to "go nuclear" is indeed very difficult for a poor country like India. In 1979, the CIA's basic intelligence fact book stated that in order for India to produce nuclear weapons of a moderate quantity, the country's defense budget (which was then \$3.7 billion) would have had to increase by as much as 8.1 percent.³ Today, that figure is much higher. Deciding to go nuclear has its inherent disadvantages to a developing country like India which needs to use its funds for economic improvements. Therefore, while the capacity to go nuclear exists by geographic reasoning, it will be strongly influenced by other elements of the nation, particularly its economic and political elements.

The human component of India's geography has had the maximum influence on its military element. The net

influence of India's population, social structure, culture and diversity has the following resultant effects.

It has shaped the military's recruitment policy and composition of forces. A large number of units continue to exist as single-class units. Military leaders agree that such composition assists in maintaining cohesion under stress. A number of jobs continue to be performed by people of certain castes/groups that have traditionally been engaged in that vocation. The armed forces in recent years have been experimenting with mixed class composition with success but it will be a long time before the entire armed forces rids itself of this phenomenon of class/caste composition. The change will first need to occur in India's society. The homogeneous nature of the armed forces and its performance provide concrete evidence that suitable military policies exist to accommodate the peculiarities of India's social structure and historical legacy left by nearly three hundred years of British rule.

The large active, reserve and paramilitary components of India's military element are purely voluntary and conscription is not necessary. The country is able to maintain a large volunteer force by drawing upon its large manpower base - a positive asset to the military that accrues from the physical component of geography.

The technological manpower available to the country is again being adequately harnessed for its military

element. The Defense Production Department and the Defense Research and Development Organization are making commendable progress in their contributions to the country's military element in a wide range of areas. It is further seen that necessary incentives and policies are in force to draw technological manpower for certain jobs/positions in the armed forces.

The application of the bilingual policy for the armed forces, making Hindi and English the 'languages of the military', is imperative. It has facilitated better training, coordination and helps in interpersonal relations. Hindi as the medium of instruction and conversation amongst ranks below commissioned officers suits the armed forces. The bulk of military manpower is drawn from rural India where levels of education are low. However, it is easy to learn Hindi as nearly all Indian languages are derived from the ancient Indian language called Sanskrit; Hindi is a direct derivative of Sanskrit. The medium of instruction and communication amongst officers is English, which is taught all over the country from primary school level.

Lastly, the armed forces focus on building up professional and effective leadership, by way of an efficient officer corps, is a definite requirement guided by the human component of India's geography. Officering any organization with the diversity presented in India is no mean task. India has a well trained and motivated military

machine. The armed forces have acquitted themselves with credit in the past. This has, in large measure, been possible because of its sound military leadership. History is replete with examples where leadership has been the major contributing factor for the performance of an army. The Indian military element has done well in this field.

The geographic element of India has a distinct and remarkable influence on its military element. The military element is also influenced by India's security perceptions, its economic and political elements, its history and so on. It would be prudent to remember that a number of facets of geography are themselves the result of India's history and the process of social evolution. Therefore, while some aspects of the military element smack of its historical legacy, let it not be forgotten that their corresponding geographic consequences are the result of its history too. Of the three components of geography examined in this study, viz., the physical, economic and human components, it is seen that the human component has had the greatest influence on India's military element.

India's military has made good use of its geographic element. There are isolated features that could be put to better use. Given this blessing of its geographic components, they could also be used for the benefit of the society at large.

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APPENDIX A

DEFINITION OF KEY TERMS

Caste System In India. Society in India is stratified into classes, castes and sub-castes. Some view it as a refined form of apartheid. Centuries ago, the Indian people began to divide into different groups. At first these were only separate classes depending on their vocation. Subsequently, classes were divided into castes with the most powerful groups finding a way to strengthen and preserve their own privileges and position. The caste system is a hierarchy of four castes: Brahmins are at the top and were priests and teachers; Kshatriyas are the second and comprised soldiers; Vaishyas are the third and were landowners and traders; Shudras are the last and were laborers. Outside these four groups was a fifth group of the Untouchables. They were thought to be unclean as they swept streets, treated animal hides and disposed of the dead. Today, while the caste system is officially forbidden by constitution, it does exist unofficially. Eradicating this system from Indian society will take time and a solution does not seem possible in the near future.

Extended Families. Also referred to as joint family system in India, the extended family system is a practice where all members of a family live in one house. As the family grows, more members are added to the clan and they too live in the

'family house'. Incomes are pooled and this gives added security in a country with inadequate job opportunities. The system promotes a false sense of security and lethargy. The system also strengthens family bonds and groupism more than it does nationalism. Today, the extended family system is dying down at a rapid rate.

Imperative. An Imperative is an essential prerequisite to any activity that it is associated with, and that enables the activity to be performed successfully. It could be equated to a principle or a tenet necessary for the logical outcome of any endeavor. In this thesis, an imperative is taken as an essential prerequisite.

Jagir. During the period of British rule in India, a piece of land given to an individual as a gift for his services to the British crown, was called Jagir. An individual who was gifted with many Jagirs for continued services to the British government, was called a Jagirdar. The word Jagir today is associated with deserving reward and a Jagirdar is a respectful title preceding an individual's name. The system works like the British Knighthood and the title 'Lord'.

Para-Military Forces. Military forces not part of first line active Defense Services, are termed para-military

forces. Their primary role could include security of the border during non-war periods, internal security roles and guarding of sensitive facilities, both military and civil. However, in the event of war, they may be used to augment active first line defense services.

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